JULY 1953

American Engineer

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IN THIS ISSUE

● A MESSAGE FOR PROFESSIONAL ENGINEERS

By T. Carr Forrest, Jr., P.E.

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5. Cylinder and Burner Phenomena
6. Performance
7. Turbine Engine Characteristics
8. Structural and Mechanical Requirements

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Letters

Strong on Weeks . . .

Dear Editor:

Inasmuch as the article beginning on Page 21 of the May, 1953, issue is not credited to a named author, I assume it is editorial.

I object to the phrase in the title: "The Walls Come Tumbling Down," when read in connection with the comments "From Washington" to which the author (or editorial writer) refers. It gives the inference that the Bureau of Standards is in danger of being disbanded, which I do not believe is the intent of Secretary Weeks (Commerce Dept.).

As to the proper activities of the Bureau of Standards, either on its own initiative or at the request of other governmental agencies, there is room for differences of opinion, and I respect the right of any individual to express views which reflect his, or her, honest convictions. As for myself, I hold it is no proper function of government to pass upon the merits of materials or processes not involving public health or safety, except where those materials or processes are intended for governmental use.

As to the Federal Trade Commission's mission—inasmuch as it's a quasi judicial function—it can be fulfilled by reliance on the testimony of witnesses produced in the customary way. It is not the responsibility of the Government to take action in a case such as that of a storage battery additive unless a complaint is filed; and then it should be the duty of the complainant to produce preponderant evidence. In the instant case, the testimony of M.I.T. scientists contradicted that of the Bureau of Standards, on a claim that it should be possible to prove or disprove. Consequently, someone erred. Evidently the circumstances convinced Secretary Weeks it was the Bureau of Standards, an agency of his department of Government. Assuming the Secretary had all the relevant data, and they pointed to less than a wholly disinterested opinion, he was justified in taking disciplinary action. The idea that scientists are sacrosanct is repulsive. Let them be right or take the consequences, as all others must.

The only "slant" given editorial comment in the publication of a society such as N.S.P.E. should be that which reflects the policy of the *society*.

HUBERT E. SNYDER, P.E.
Cleveland, Ohio

Attention Letter Writers:

►Every month brings us more and more letters from our readers and we are happy to have them, but we now find ourselves very pressed for space.

So . . .

Please keep letters short and to the point. If you want to write at greater length, submit your piece to the "Professional Postscripts" feature.

—The Editors.

Weak on Weeks . . .

Dear Editor:

Discussion of the Astin case in the May issue of the AMERICAN ENGINEER dealt in too gentle a manner with Secretary of Commerce Weeks. The article on page 11 of that issue was an excellent statement of details

(*Please turn to page* 5)

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American Engineer

JULY, 1953

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—Henry Ford II

•

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NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS FOUNDED 1934

Letters

(*Continued from page 3*)

and principles involved in this controversy, but N.S.P.E. apparently failed to take a strong stand on the issues.

It seems clear that the principles and policies concerning testing of products have already been set by the Congress of the United States, and if Secretary Weeks were not in sympathy with those policies, he either should not have accepted his position or he should have appealed to the Congress for changes in these policies rather than firing the head of the Bureau of Standards for carrying out policies set by Congress. It appears he will now hire for a new department head only someone who will agree to ignore the law as set forth in these policies.

The article states that engineers will be keenly interested in the "developments" of the facts and opinions on the issues. I believe N.S.P.E. should go much farther than merely proclaiming interest in the case because it is obvious that the facts and opinions have already been "developed," and engineers certainly should have by now been fully committed to hearty condemnation of the action taken by Secretary Weeks. N.S.P.E. should make a real effort to assist in preventing Secretary Weeks from getting away with such high-handed and destructive procedure.

THE AMERICAN ENGINEER should labor again on this matter and bring forth something far stronger than the weak article in the last issue. N.S.P.E. simply must take a more courageous stand on matters of this kind than it appears to have taken thus far.

(Name withheld by request.)

On NSPE Beliefs . . .

Dear Editor:

Just a note to tell you how much I enjoyed the "N.S.P.E. Believes" articles in the last two issues of the AMERICAN ENGINEER.

Unity for professional action and limiting membership through registration are two very important subjects . . .

I think the articles are well written and clearly and concisely cover the subjects. I hope Mr. Robbins will continue writing on other important subjects confronting our profession.

GEORGE J. NICASTRO, P. E.
New York, N. Y.
Past V. Pres., N.S.P.E.

Utility Taxes . . .

Dear Editor:

This is in reference to the letter from E. L. Tennyson on page 5 of the May issue of THE AMERICAN ENGINEER. The effect of current taxation on the utility field is well stated. It has long been the belief of the writer that all utilities should be wholly exempt from all taxation, real, personal and income, and that taxes on the operations of utilities should be collected in the form of a tax on service charges, similar to the sales tax.

Since it is unlikely that such tax treatment will be given, and because of the very large capital investment needed for transport systems, it appears unlikely that the development of adequate transit facilities can be left to private enterprise, and there is the question of allowing private interests to profit from a place of business supplied at public expense.

At one time highways, postal service,

(*Please turn to page 31*)

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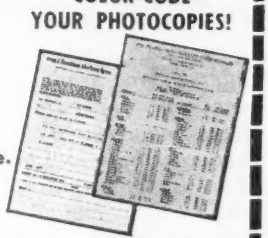

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Professional News in Capsule Form

Arthur J. Benline Heads Building Officials • Full Employment Predicted for New Graduates • Reservist Recall Would Affect One-Fourth of National's Chemical Engineers • Solar Energy Conference Planned • Other Items of Interest

Arthur J. Benline, a member of the Bronx Chapter, New York State Society of Professional Engineers, was elected president of the Building Officials Conference of America during the group's recent annual meeting held in Dallas, Texas. Now consultant and technical director for the New York State Building Code Commission, while on leave from his position as superintendent of New York City's Department of Housing and Buildings, Mr. Benline is assuming his new office on July 1.

He also holds the rank of captain in the Civil Engineers Corps, United States Naval Reserve, and he commanded Seabee battalions from North Africa to Okinawa during World War II.

* * *

Starting salaries currently being offered June graduates are about 10 per cent above last year's record levels, and nearly all available graduates will have jobs before September. This is the bright conclusion resulting from the annual employment survey conducted by the Family Economics Bureau of the Northwestern National Life Insurance Company.

Since 60 to 75 per cent of the male graduates are headed for early military service, women are being offered many positions that would ordinarily go to men, but many of the larger companies are signing up the men even though they may be able to work only two or three months before going on active duty with the armed forces.

The greatest rush, the company reports, is for engineering graduates, with the monthly salaries offered ranging from $325 to $375, and some outstanding individuals even getting $400. Northwestern National Life's survey covers some 131 universities, colleges, and technical schools.

* * *

A sizable proportion of the country's chemical engineers and chemists could be withdrawn from civilian employment by a general call-up of reservists, according to the conclusions cited by the Bureau of Labor Statistics in a newly-published report prepared in cooperation with the National Scientific Register. One-fourth of the chemical engineers and one out of every six chemists included in the survey on which the report is based were members of the reserve forces at the time they filled out their questionnaires.

Approximately 13,000 chemical engineers, 52,000 chemists, and 7,000 graduate students in chemistry and chemical engineering were covered by the survey, which was conducted in 1951 by the National Scientific Register with partial support from the National Science Foundation. The Register and its responsibilities for registration of scientists were transferred to the Foundation in January 1953.

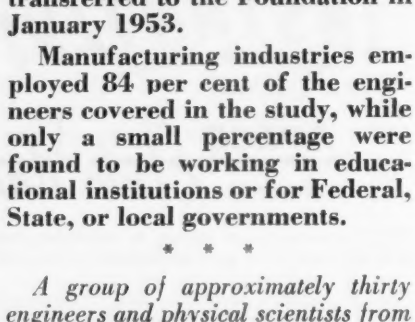
Manufacturing industries employed 84 per cent of the engineers covered in the study, while only a small percentage were found to be working in educational institutions or for Federal, State, or local governments.

* * *

A group of approximately thirty engineers and physical scientists from the United States and abroad will meet in a special conference at the University of Wisconsin, September 12-14, to discuss solar energy and its utilization. They will assess present knowledge in this field and point out needed areas for basic research in the physical and engineering sciences, and their findings will be published and given wide circulation in scientific and engineering circles.

Farrington Daniels, professor of physical chemistry, University of Wisconsin, has been named chairman of the planning committee for the conference. Other committee members include: Werner A. Baum, associate professor of meteorology, Florida State University; F. G. Brickwedde, National Bureau of Standards, currently on leave at the University of California; Hoyt C. Hottel, professor of engineering, Massachusetts Institute of Technology; Everett D. Howe, professor of mechanical engineering, University of California; and Ralph A. Morgan, program director for engineering, National Science Foundation.

A $6,000 grant has been made to the University of Wisconsin by the National Science Foundation in partial support of the conference.



"Mr. Glibwicket puzzles me. Today he called me 'his little coefficient of expansion'!"

* * *

The American Society for Engineering Education held its Sixty-first Annual Meeting at the University of Florida in Gainesville, June 22-26.

NSPE Vice President N. W. Dougherty, Dean of Engineering at the University of Tennessee, was among the prominent participants in the five-day conference which attracted engineer-educators, including many other NSPE members, from all over the country.

Numerous educational problems, programs, and methods in the engineering field were covered in the many specialized symposiums that highlighted the meeting.

W. R. Woolrich, Dean of Engineering at the University of Texas and an NSPE member, is president of the Society.

* * *

Emil H. Praeger, a prominent member of the New York State SPE, has been selected as "Metropolitan Engineer of the Year" by the Board of Directors of the Metropolitan Section, American Society of Civil Engineers.

Mr. Praeger won the citation for his design of Pier 57, Hudson River, a project that has attracted widespread engineering interest. Another notable engineering contribution made by Mr. Praeger was his design of a breakwater for use in the invasion of Nor-

mandy during World War II. He also served as a consultant in the recent renovation of the White House.

* * *

The Board of Directors of Resources for the Future, Inc., has elected Dr. R. G. Gustavson, Chancellor of the University of Nebraska as the organization's president and Horace M. Albright, president of the United Potash Company, Inc., chairman of the Board.

A nonprofit corporation, Resources for the Future was established last year by a committee of citizens on invitation from the Ford Foundation. Its purposes are to serve as an advisory body on resources, to assist the officers of the Foundation in planning a program, and to work in the field of research and education for resources development and conservation.

Plans are currently under way for a Mid-Century Conference on Resources for the Future, to be held in Washington, D. C., December 2-4, 1953.

* * *

An unnecessarily pessimistic attitude on the part of business management could actually bring on a depression, warned Arno H. Johnson, vice president and director of research for J. Walter Thompson, the well-known advertising agency, in a recent address before a meeting of the American Marketing Association in New York.

On the other hand, we "could reach a standard of living one-third higher within the next five years if we did no more than produce at the same per capita rate that we actually reached during the war peak of 1944," he stated. "But civilian markets must expand in a dynamic way to utilize this productive ability."

* * *

A group of eight engineers—six from Thailand and two from Turkey—are being given Geological Survey training, in cooperation with the Mutual Security Agency, on methods and techniques used in the United States to appraise the occurrence, movement, and chemical quality of ground water resources, according to an announcement from the office of Secretary of the Interior Douglas McKay.

Scientists and engineers of the Geological Survey are in charge of the program, which is a version of a course given periodically to new members of the Survey's Water Resources Division. The purpose of the course is to provide practical background knowledge which the men may apply in their own countries.

In addition to studying in Washington, D. C., where they heard introductory lectures, the trainees are being taken on a tour of the United States, with further instructions in "Irrigation Practices" being given in Utah, Oregon, Washington, and Colorado.

* * *

The City College of New York's School of Business and Civic Administration is inaugurating a new graduate degree program this summer designed to train engineers for positions in management. The course, which may be completed on a full-time basis in one summer session and two regular semesters, or on a part-time basis in one summer session and four regular semesters leads to a degree of Master of Business Administration in Industrial Management.

The program was planned to meet industry's demand for engineers with management-level business training in addition to their technical background. Among the subjects offered in the program are Personnel Administration, Job Evaluation and Wage Incentives, Industrial Supervision, Time and Motion Techniques, Cost Accounting, Labor-Management Relations, Cost Reduction and Control, and Techniques of Management Survey.

* * *

Industrial psychiatry, "an emotional first aid station," has justified its bid for a place in American industry, according to Dr. Lydia G. Giberson, adviser to employees at the Metropolitan Life Insurance Company in New York. Dr. Giberson made this statement at a recent meeting under the joint sponsorship of New York University's Department of Industrial Medicine, Post-Graduate Medical School, and the American Academy of Compensation Medicine.

She also stated that the hours spent in the handling of employee problems that affect operating efficiency could be reduced by close cooperation among personnel, the medical department, and management.

* * *

The University of Florida has announced the broadening of its graduate program in Community Planning through the organization of an inter-departmental graduate faculty in planning. The curriculum, first established as a graduate program in 1948, will lead to the degree of Master of Science in Community Planning.

The graduate faculty members appointed to administer the program represent eighteen University departments, including civil, electrical, industrial, and public health engineering. Originally the Community Planning course was open only to holders of a five-year undergraduate degree in architecture.

* * *

The election of a registered engineer as mayor of the city of Pasadena, California, took place recently, when the Board of Directors chose Clarence A. Winder, P. E., for that office. An electrical engineer, the new mayor has been consultant to many municipalities on public utility rate-structure.

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T. Carr Forrest, Jr.

Think and Act As Professional People, Urges NSPE's New President T. Carr Forrest, Jr.

No higher honor can come to a man than that of being selected as a leader of the organization to which he belongs, and so I accept the office of President of the National Society of Professional Engineers with a deep sense of appreciation for this honor, and with a pledge to give the best that is in me during the ensuing year towards the advancement of the objectives of our Society.

In making this pledge, I know I can say the same for the Regional Vice Presidents. Indeed, the Nominating Committee reflected the wisdom of a Solomon in selecting such outstanding men for these regional offices. It is their desire to be as helpful as possible to the State Societies and Chapters in their respective areas. Let me urge that full advantage be taken of this available talent.

On this particular occasion, I wish to emphasize only one phase of our lives and that is the development of a professional consciousness. If, overnight, this mantle could be draped over our shoulders, the effect would be startling, not only to those with whom we work and live, but to ourselves as well. It would quickly develop a profound respect from those to whom we report, and the public would immediately recognize us for the all-too-true and overwhelming responsibility which we exercise over its health, its safety and its economic welfare.

This miracle is not going to happen suddenly. To bring it to pass is the task of every engineer in this nation, contributing individually and collectively to this effort through a well-coordinated public relations program such as that recently initiated by your National Society.

Therefore, we must *practice* being professional engineers. Although it may seem almost too obvious to mention, I feel I must remind you of the importance to the professional man of personal appearance. Gone are the days when the engineer could afford not to look his role.

Another form of practice is the attitude we reflect when discussing engineering problems with senior members in our own organizations. Let us be well prepared to present our viewpoints and then do so with the courage of our convictions even though they may not be popular.

Most important of all is our reception by the public. Let us inform ourselves on public matters and then speak with the confidence that a well-trained engineering mind can inspire.

Then let us extend the practice of professional consciousness in cooperation with our fellow engineers, and, as a society, let us cooperate to the fullest extent with other engineering societies in advancing the aims and objectives of our profession. Submerge the idea of "who gets credit for what" and *practice unity*.

If we practice thinking and acting as professional people, we will soon acquire that status. While we are doing this, we must, above all other things, make it a point to inculcate this consciousness in the engineering student when he is in college. At that time his mind has a great absorptive capacity. He is eager to become everything that an engineer should be and therefore will quickly and easily develop the proper concept of a professional person. This should be a continuing program for all chapters that are located in an engineering school community. For those chapters not so located, let me urge you to foster and continue the practice of making your members available for consultation to high school graduates who are considering engineering as a career.

In support of these individual efforts, it is my hope that the financial affairs of our Society will soon permit the inclusion of a substantial sum in each annual budget for a strong, vigorous and continuing public relations program. We must realize that engineers, especially those in industry, are several times removed from the people who benefit from their efforts. A public relations program is the best vehicle to use in bridging this gap. The one which was initiated a few years ago and sustained up to this year by private subscription has established its value. We simply must find a way to place it on a permanent basis.

Now, if we, as individuals and chapters do just these things which I have enumerated, and do them well for a period of five years, we will be astounded at the increase in our individual prestige in our own communities, and this nation of ours would place the engineering profession on the high pedestal it should justly occupy. All this can easily come to pass and with it will come an awakening awareness of the influence that engineers have over the lives of everyone in the world today.

Let me also suggest that we seek spiritual guidance in the use of this power in order that it may continue to aid and abet our way of life in this nation and permit it to spread throughout the world for the benefit of mankind.

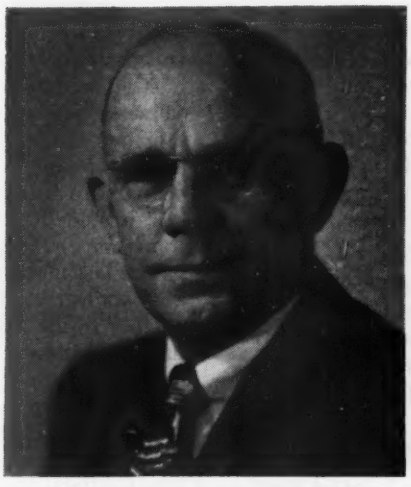
We must look professional—Act professional—Be professional.

Sincerely,

Carr Forrest

NSPE Officers for 1953-54

Alfred J. Ryan
Vice President
Southwestern Area
Denver, Colo.



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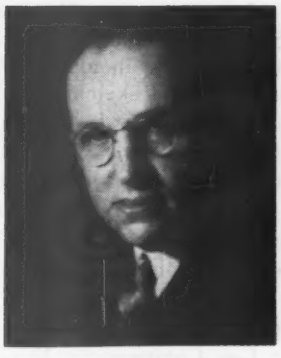

Edwin Wilbur Seeger
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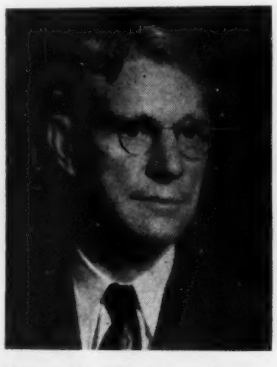
Central Area
Milwaukee, Wisc.



Dean N. W. Dougherty
Vice President
Southeastern Area
Knoxville, Tenn.

Clarence T. Shoch
Vice President
Northeastern Area
Allentown, Pa.

Orland C. Mayer
Vice President
Western Area
Boise, Idaho

Christopher Y. Thomas
Vice President
North Central Area
Kansas City, Mo.

Paul H. Robbins
Executive Director
Washington, D. C.

Russell B. Allen
Treasurer
College Park, Md.

Three Engineer-Artists

Canvases Show Talent and Imagination

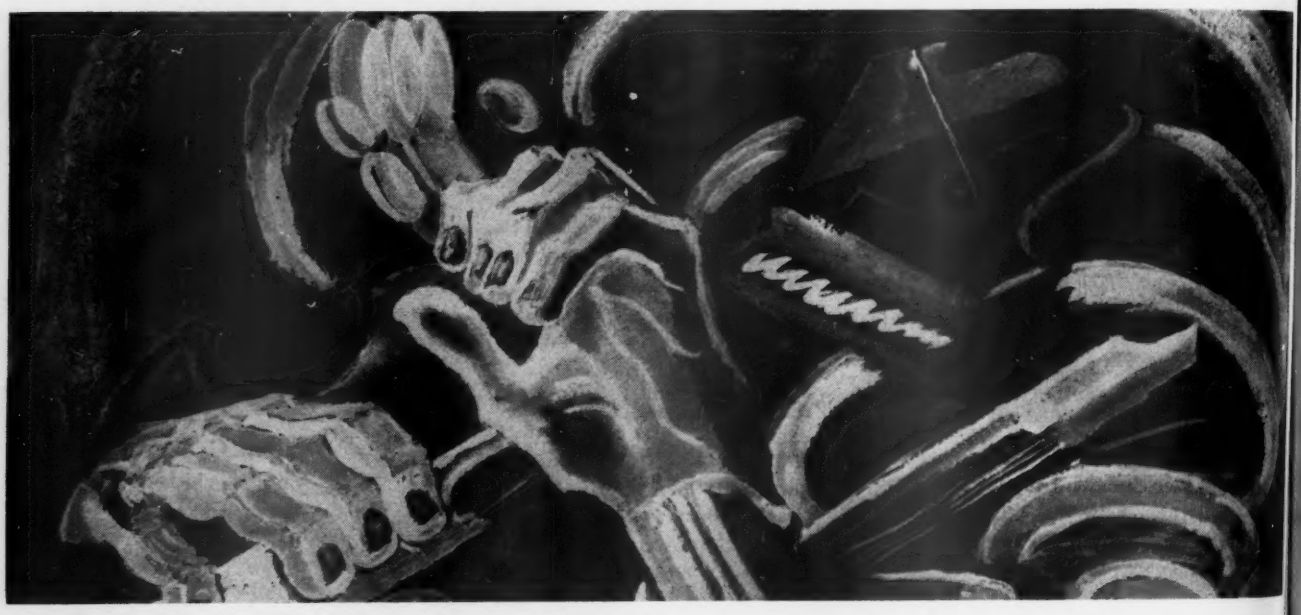
On this page the AMERICAN ENGINEER is introducing three more engineers who are artists, too, and whose canvases reflect a great deal of ability.

Two of the men are "Hoosiers," members of the Indiana Society. H. Tour Tuinman, whose farm scene reproduced here has an almost photographic quality, has been painting and sketching since school days but has never had a formal art lesson. His engineering specialities are water purification, water filtration plant design, and water distribution systems; and he says of his artistic hobby that "it is a great thing to take one's mind away from the problems of making a living in this hectic world of ours." His home is in Hammond, Indiana.

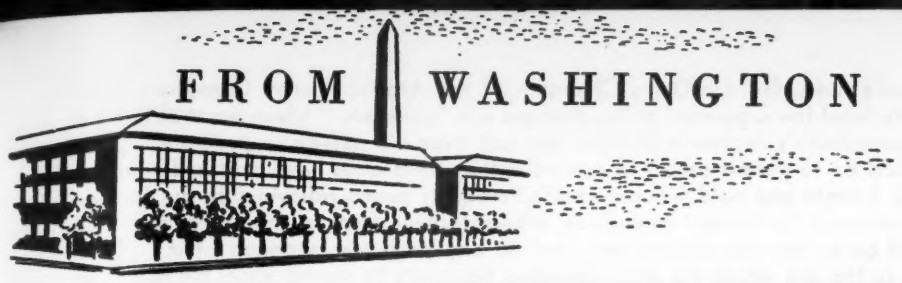
The second Indiana artist is Col. Leslie I. Neher, currently doing industrial engineering work for the Central Indiana Gas Company in Muncie. He is a well-known authority on Korea, having made a study of the people and their customs while doing a tour of duty in the Far East immediately after World War II, and his Korean canvases have attracted much attention at exhibitions. As a matter of fact, World War II gave the main impetus to the development of this avocation when he found "that oil paint, a brush, and a canvas after a long and difficult day provided both physical and mental relief from the sometimes exhausting stresses of military life."

The last member of the artistic trio is O. Clarke Mann, a structural engineer from Memphis, Tennessee, and a partner in the firm of Merrill & Mann. He has done structural and industrial engineering for ordnance plants, factories, airports, hospitals, theaters, and warehouses; and his firm has recently completed the structural engineering for the Central Hospital now under construction in Lima, Peru. His unusual paintings and artistic studies, such as *The Violinist* pictured here, have excited considerable interest and attention.

Below is *The Violinist*, painted by O. Clarke Mann, a structural engineer of Memphis, Tennessee.



Below, at the left, is Col. Leslie I. Neher's *Korean Teeter-Totter*, depicting special ceremonial recreation in celebration of the Oriental New Year. At the right is a farm scene painted by H. Tour Tuinman of Hammond, Indiana.



FROM WASHINGTON

By

Milton F. Lunch,

N.S.P.E.'s Legislative Analyst

The Atomic Energy Act of 1946 was adopted after a lengthy and sometimes bitter debate over the simple but major question—should atomic energy development be controlled by the military or by a civilian agency? Civilian control is now well established and there is no thought whatsoever of attempting to change the basic policy decision. Now, however, a new debate of equal policy importance is developing and the outcome will determine the direction of atomic development for peacetime uses for many years or generations.

The current question is also simply stated despite the enormous complications which beset the future answer—shall private enterprise be given the major responsibility for converting the unlocked power of the atom into practical usage for farm, home and factory, or shall the present pattern of government control and responsibility with private industry participation on an agency basis be continued? Although the basic research on atomic energy will continue, and may even be accentuated, the question raised above relates to bringing into full play the energies and talents of thousands of engineers to grapple with the conversion of atomic power into practical commercial usage on an efficient and economical basis.

With the election of Eisenhower's "business administration" there was a general assumption that the policy change would be made and the only difficulties would be the technical ones involved in such a change, such as adequate security measures, financial arrangements, patent rights, etc. The article by AEC Commissioner Thomas E. Murray, P.E., in the April issue of the AMERICAN ENGINEER covered some of the major considerations involved in the contemplated policy change and pointed out that when "Seven (b) Day" (change in policy to private development) arrived there would be some persons urging "retention of State ownership."

The "day" envisioned by Commissioner Murray has not yet arrived but the debate has already begun in earnest. So far the argument has been among the "experts"—members of the Atomic Energy Commission, the Congressional Committee on Atomic Energy, public utilities officials, and power experts.

* * * *

One of the first important protests against the contemplated policy change came from Representative Chet Holifield of California, a member of the Congressional committee who told his House colleagues that "a campaign is afoot to drum up sentiment for drastic changes in the Atomic Energy Act" and "I do not intend to sit idly by and give silent assent to a give-away program in atomic energy." Holifield's comments are too lengthy for full reporting but some of his major points in opposition to suggested legislative changes (See Legislative Bulletin, May 21, 1953) are: commercial electrical power from atomic energy is "not just around the corner;" at the present time atomic power would be too costly for industrial use; no private company is prepared "to invest a cent of its own funds" for reactors for the commercial production of atomic power "unless substantial aid is forthcoming from the Federal Government;" budget cuts by the administration in the atomic-energy program "fit in with demands for concessions to private industry;" there are overwhelming problems of security; commercial development would rest on the necessity for government purchase of privately-produced plutonium at high and uneconomical prices; the relatively few large corporations "on the inside of the atomic-energy program would stand to gain the greatest benefits from immediate changes in the law" thus narrowing the opportunities for competitive enterprise in the atomic field; the government could effect great savings if it supplied all or part of the electric power needed for atomic installations by developing its own atomic power; and the investment of public funds of from ten to twelve billion dollars should not be sacrificed.

The Californian declared that private industry should participate to the fullest possible extent in atomic activities, pointing out that the Atomic Energy Commission now depends upon private industry to construct and operate the atomic facilities. In short, Holifield says that the program and policy as presently established should be continued for an indefinite period and the time is not yet at hand to consider basic changes in the law relating to private control and operation.

* * * *

(Please turn the page)

Responding to Holifield's views, Gordon Dean, Chairman of the Atomic Energy Commission says that "it is simply not true" to label the suggested policy changes as a "giveaway." Much less than being a "giveaway" policy, the Commission's recommendations are not even "a sell-away program," Dean avers. "All it would do would be to permit others to own what they themselves have built and paid for, or, in the case of materials, bought and paid for, or manufactured. It seems ridiculous to me for one agency of the Federal Government to attempt to exclude others forever from a promising new field whose main significance will be to the over-all economy, not to any particular segment of it." Dean listed three basic changes in the law which the AEC considers necessary to permit wider participation by private interests; (1) The ownership and operation of nuclear power facilities by groups other than the Commission, (2) The lease or sale of fissionable material under safeguards adequate to assure the national security; and (3) The use and transfer of fissionable or byproduct materials by the owners of reactors, subject to purchase by the Commission or regulation by the Commission in the interest of health and safety. On the important problem of patent rights, Dean says that the Commission can adjust its practices within the law as it now exists to grant more liberal patent rights.

The AEC Chairman says that the controversy boils down to a question of fair play and common sense. "I think it is obvious that we cannot expect private concerns to come in and spend millions of dollars without getting some benefits, and I think it is obvious that private concerns as well as the government must be in this power program. Otherwise we can never have real competition, the catalytic agent of progress, and we will always have a program limited in size and scope by the range of the Federal Government's imagination and vision, which is not always as broad as it might be."

But another member of the Congressional Atomic Energy Committee — Representative Melvin Price of Illinois—says that the contemplated changes will result in benefits only for the relatively few large companies which have participated in the atomic program. He challenges the willingness of private industry to finance itself in atomic work and charges that "any disturbance in the present program would cause unpredictable delay and dissolution of the efficient team of technicians now engaged in the effort. Price also brought up another "touchy" subject which has become involved in the dispute—the participation of cooperatives and small business generally when private interests are given the "green light."

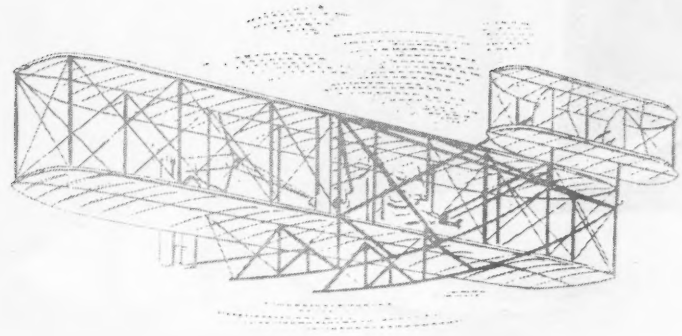
Leland Olds, former chairman of the Federal Power Commission has raised similar objections, charging that the present proposals "would have the effect of turning the atomic industry, lock, stock, and barrel, over to big business." Olds declared that the recent formation of Atomic Industrial Forum, Inc., (AMERICAN ENGINEER, June, 1953) was a device to accomplish this purpose. To these charges, AEC Chairman Dean says that the same "ground rules" should apply to everybody, "and when I say everybody I mean federal agencies, state agencies, municipal agencies, and private industry. Everybody who has something to offer to the development of atomic power should be allowed to make a contribution to that development."

On the "giveaway" point and the argument that private industry will not put its capital into atomic ventures, it is interesting to note that within a few days after the Holifield and Price speeches a group of private industrialists told the joint congressional committee that they were prepared to construct a plant for the production of atomic power without substantial Federal subsidy or guarantee. The group said it had sufficient capital for the venture and would require no Federal commitment to buy the plutonium for use in the government's weapons program. The Joint Committee has been holding closed hearings on the proposed changes in the law.

* * * *

The only conclusion one may derive for the present is that there is not going to be any sudden swing from federal to private domination of the atomic development; rather it is more likely to be a gradual transition both in the law and in the daily operations and policies. A second preliminary conclusion is that at the present stage there are more problems than there are answers. AEC Commissioner Henry D. Smyth, presented the major problems in a recent address at Case Institute of Technology, citing such difficulties as security and industrial safety, how the price of uranium 235 and plutonium would be established, how to insure that the government would obtain as much atomic explosive as it needed, how to handle the taxpayers' enormous investment in atomic development, how to dispose of the present plants, and the patent problem, which is one of the knottiest. "At what point do new ideas cease to be the property of the people of the United States who paid for the initial part of the development period and then become the property of the private companies who paid for only a part of the chain of events leading to a discovery or an invention?"

None of these many questions are insoluble but they involve an admixture of two normally separate talents—technology and politics. It would be the height of naivete to attempt to resolve the difficulties without a realistic recognition of both and it will be equally fruitless to have political considerations alone dictate the conclusions. Those concerned with technology can no longer remain aloof from the political and social implications of their work. Perhaps no other important issue of recent years so well illustrates the imperative necessity for professional engineers and scientists to understand and exert their influence in the solution of problems of this nature which so vitally affect not only the further development of science and technology but the welfare of the nation.



Aircraft Engineering

MOVES WITH SEVEN LEAGUE BOOTS

In less than a decade, the aircraft industry has become one of the nation's biggest users of engineering talent. To commemorate the Golden Jubilee of man's first flight, the* AMERICAN ENGINEER *has made a survey of many of the nation's leading aircraft companies and herewith reports some recent achievements and the future prospects of engineers in that field

BREATHES there an engineer who, having scanned the plethora of "Help Wanted" ads for engineers which the aircraft industry has placed in professional magazines, newspapers and similar media, has not to himself mused, "I wonder how solid those jobs are? What sort of a future is there for engineers making airplanes?"

In accordance with its policy of attempting to get the facts on matters of interest to engineers which they cannot obtain elsewhere, the AMERICAN ENGINEER has conducted an informal but extensive survey among leaders in the aircraft industry to see what the prospects are for engineers in aviation.

Companies responding to the survey represent a majority of the employer-potential for engineers in the aviation industry. They include: The Glenn L. Martin Company; Lockheed Aircraft Corp., including its Georgia Division at Marietta, Ga., and the California Division at Burbank, Calif.; Convair; North American Aviation, Inc.; Boeing Airplane Company; Northrop Aircraft, Inc.; Pratt & Whitney Aircraft; Fairchild Corp., Aircraft Division; and Goodyear Aircraft Corp.

It has been exactly 50 years since man's first successful flight was accomplished by the Wright brothers on the bleak sands of Kitty Hawk beach in North Carolina in 1903. A great deal of commemorative material has already been published in the popular press emphasizing the trials of the "unknown bicycle mechanics" from Dayton, Ohio, who invented the first machine which could sustain flight in the air. These stories have related in considerable detail the trials and discouragements of these two truly great men, even including the interesting historical fact that their attempt to create a "flying machine" was considered impious by certain members of the clergy who maintained that if God wanted men to fly, He would have created them with wings like angels.

While no one wants to discount the achievements of the Wright brothers, or their great courage in the face of adversity, it might be a little more accurate to note that

Here a new Boeing aircraft is put through wind tunnel tests.

they were far from humble bicycle mechanics who puttered around with gadgets. Although they had not studied engineering, both were, judged by the standards of their day, accomplished engineers. And the great principles upon which they made their literally world-shaking invention were engineering principles.

This is no idle claim by an engineering magazine seeking to glorify engineers. It has a sound basis in fact. Let's briefly review the facts surrounding the Wright brothers' invention. They point the moral, we believe, that if ever a body of knowledge and an invention owed its very existence and progress to a profession, the body of knowledge is aerodynamics, the invention is the airplane and the profession is engineering.

Shortly after they became interested in the experiments of German glider enthusiasts, the Wright brothers became convinced these men were making the wrong approach to the problem of flight. They were trying to steer the craft by shifting the weight of their bodies while in flight. This, the brothers Wright were convinced, was totally inadequate. They were proved right when several of the German aerialists met untimely ends by crashes.

Orville and Wilbur Wright constructed a miniature wind tunnel in their home town, Dayton, Ohio, and studied the effect of changing the pitch of wing flaps from zero to forty-five degrees. They were convinced that a practical airplane could be built which would have a constant center of gravity with the steering accomplished by varying the angle of the wing and tail and varying the pressure on any part of the aircraft as the operator desired. Orville Wright records in his famous diary, written in early 1903, that, as a result of these studies, he and his brother were convinced that most of the then-prevalent information about the behavior of aircraft was totally erroneous.

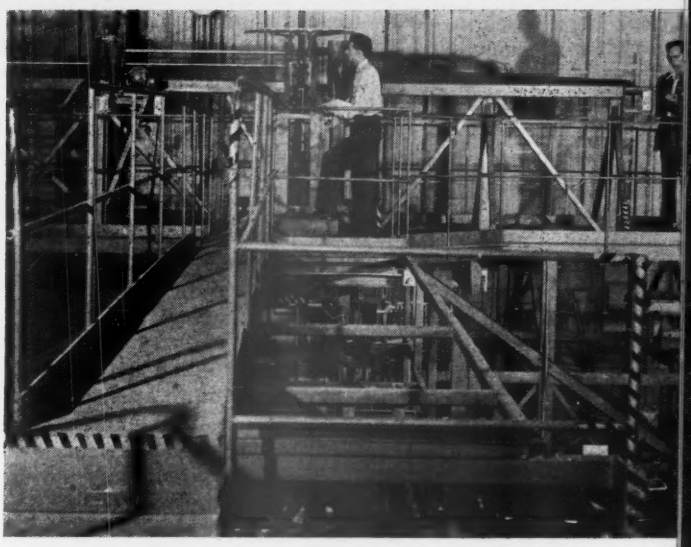
Surely, these men were more than tinkerers or bicycle mechanics!

Using the engineering data compiled, they built the machine which conquered the air and changed the course

of world history. One result of their studies was to reduce to about one-third the necessary power which had to be developed by a motor to lift a powered airplane into the air.

The airplane made dazzling progress. Less than two years after the first successful flight, Wilbur Wright flew another plane for 38 minutes over a circular course, covering 24 miles. And, in 1909, the Army, after tests at Fort Myer, Va., accepted its first airplane from the Wright brothers. America had an Air Force. After more successes, the Wright brothers made a barnstorming tour of Europe. drumming up interest and financial support for their invention. They were honored by the kings of England, Spain, and Italy among others, and received so many medals it would not have been possible for them to wear all their decorations at the same time.

Less than a quarter century after its invention, the airplane had progressed to the point where an unknown air-



Here Northrop test engineers Lee Beydler and Warren Schreyer check F-89 mechanism.

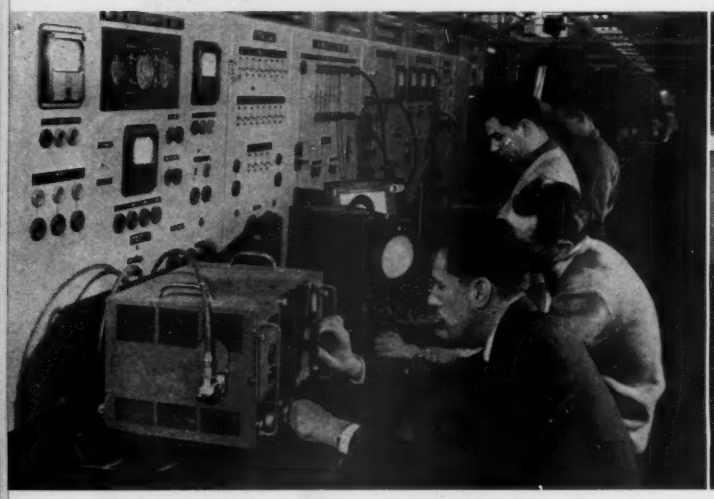
Pictured above is the interior of the Lockheed engineering building at Burbank, California.

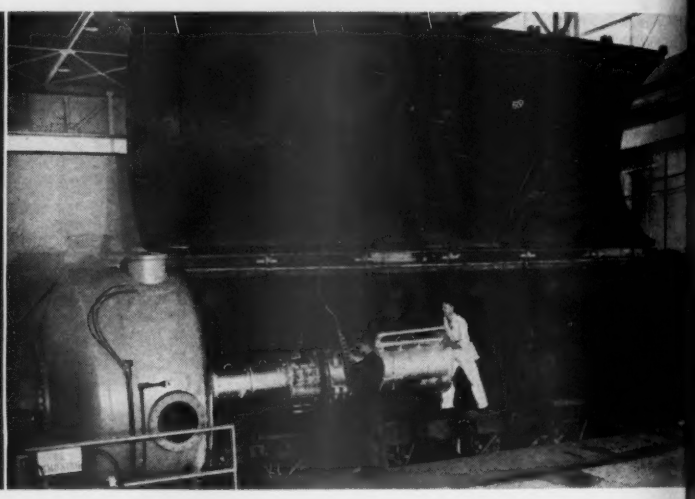
An electronics engineer with the Consolidated Vultee Aircraft Corporation inspects some of his specialized equipment at the right.

mail captain named Charles Lindbergh could fly it nonstop from New York to Paris in 1927. The developments since 1930 are relatively well known to professional engineers. Suffice it is to say that we have reached the point where a famous scientist recently deplored the fact that the moon seems to be "worthless" insofar as raw materials are concerned. This fact, he said, is holding up air space travel. If the moon had anything of value on it, we might have an added practical incentive to spur us on to take the first step in conquering space.

Noting that some engineers have been reluctant to accept employment in the aircraft industry because of the feeling that job security in that industry is not as good as in others, the AMERICAN ENGINEER queried officials of the aircraft industry as to the future prospects of engineers in that field. The consensus can be summed up by a statement from an official of the Marietta, Georgia, division of the Lockheed Aircraft Corporation. He declares:

"The over-all outlook in the aircraft industry for engineers is good. There is a terrific increase in the engineering manhours required for the design of any type of aircraft under consideration today. For example, engineering manhours required to complete the original design of a World War II fighter numbered just a few hundred thousand. Today the engineering manhours required on a modern jet fighter usually run in excess of a million. The same comparison may be drawn for other types of aircraft. And, of course, a whole new field of aircraft design has been opened in the field of missiles."





At the left above, Bell Aircraft engineers run a check on motor and generator testing devices. The photo at the right shows a large-scale ramjet engine being lowered into position for a test run in the high-altitude test chamber at the Ordnance Aerophysics Lab operated by Consolidated Vultee in Daingerfield, Tex.

Among the questions the AMERICAN ENGINEER put to leading figures in the aircraft industry were:

What is your impression of the over-all outlook for the aircraft industry?

Obviously, business is good among the industrial descendants of the Wright brothers. Every one of the executives, responding unhesitatingly, said that conditions looked excellent for a long way ahead. Thomas G. Lanphier, Jr., Vice President of Convair, summed it up by saying: "In the commercial field, passenger traffic is steadily on the increase; and by far the greater potential market for commercial aircraft—the field of air freight—has barely been tapped. Some time within the next decade or so there will certainly be developed a system for the aerial movement of many kinds of air freight."

Pointing to the military situation, Mr. Lanphier declared: "As to continuing military requirements for aircraft as weapons, the formidable fact that Soviet Russia has a growing stockpile of atomic bombs, and is engaged in a well known program for the production of ever faster and longer-range aircraft with which to deliver them, establishes a sound basis for the conclusion that there will be a continuing and growing demand for steadily improving types of aircraft and missiles for the defense of this country."

In its summary of the year 1952, the Aircraft Industries Association of America points out that appropriations for military aircraft for the fiscal year 1953 (ending June 30) were again more than 14 billion dollars, bringing the total funds appropriated by Congress for aircraft since Korea to more than forty billion dollars. The Association notes that more than 20,000 units are scheduled for delivery far in advance—from 1953 to 1955. The date for completing the nation's air arms with modern planes has been postponed even further, making employment possibilities for engineers rosy for some time to come.

Counting workers directly employed, plus subcontractors and major suppliers, the Aircraft Industries Association estimates that more than one million persons were employed in the industry at the end of 1952; a substantial industry for its age!

Bearing on the matter of job security for engineers is the second question: **Would peace in Korea be likely to produce a "bust" in the industry?**

The consensus was six to one in favor of the proposition that peace in Korea would make little, if any, difference. Speaking for the majority was an official of the Lockheed Aircraft Corporation of Burbank, California:

"We do not believe peace in Korea will have anything to do with our over-all problem. There will be a natural tendency to ease up a little if peace comes about, but even these delivery schedules will call for more airplanes per month than are being produced by the industry today. The deliveries might be stretched out further than at present and, in many ways, this would be a good idea. In our 'down the road' plans, Korea is only a small part of the problem." Further comment on the same point came from Dr. Karl Arnstein, Vice President In Charge of Engineering at Goodyear Aircraft Corporation. "It is ironical," he said, "that we must give assurance that employment will be steady in the very industry that has been and must continue to be responsible by its technical progress for vast sociological changes. Capable men will always find a gratifying future in aircraft."

All the aircraft companies responding replied that they

The Glenn L. Martin Company's Canberra twin-jet bomber is shown here in flight over the Chesapeake Bay Bridge.

are in need of engineers, although one qualified its answer somewhat by stating that it was badly in need of experienced engineers, but did not want inexperienced ones. Aerodynamicists, structural engineers, design engineers, weight engineers and virtually every speciality were mentioned as being in short supply by one or more companies.

Walter Tydon, Chief Engineer of Fairchild's Aircraft Division at Hagerstown, Maryland, says: "A secure future, exceptional opportunities for advancement and a high starting salary await the engineer at Fairchild. We have openings right now for qualified engineers and designers in all phases of aircraft manufacturing; we need top-notch men to help us in our long-range military program: turning out the famous C-119 for the Air Force."

To show the emphasis placed on engineering by the aviation industry, North American Aviation points out that the company was founded by two engineers, J. H. Kindelberger and J. L. Atwood. Kindelberger left a position as chief engineer of Douglas Aircraft to found North American and brought Atwood, who was chief structural engineer at the same company, with him. At Northrop Aircraft, Inc., Edgar Schmued, who is in charge of engineering, is a vice president. Northrop was founded in 1939 by John K. Northrop, who retired recently as president and head of engineering. He began as a draftsman engineer for Lockheed in 1916. The success story of engineers in the industry could be repeated many times, for many of its top executives are engineers. The problems involved in the business are so technical that only an engineer stands much chance of understanding and deciding them intelligently.

Speaking on some of the engineering problems involved in aviation, Mr. Kindelberger recently said: "An airplane that can achieve air superiority is a good investment of the taxpayer's dollar. An airplane that comes out second best against the enemy is a waste of the taxpayer's dollar.

"In the effort to make our present air procurement dollars a good investment, our company today has more than 8,000 people engaged in engineering, research and development.

"The more than 4,000 of these people who are in airframe engineering activity have completed a new airplane design on the average of every three months, year in and year out for the past six years. That includes 17 production designs and eight experimental models. To convey all this engineering information to our shop we are turning out engineering blueprints at the rate of more than 2½ acres every working day."

Since aviation engineering poses many tremendously specialized problems of its own, most engineers first entering the field go through extended periods of training. Typical of a response to the question: **Do you require special training in aircraft engineering from engineers you hire?** is this from Boeing Aircraft: "No. We need engineers of all branches. However, all new engineering employees go through a three-week familiarization-indoctrination course to acquaint them with Boeing practices and procedures."

Other companies have training courses of varying lengths, particularly for engineers new to aviation, and one makes the flat statement that engineers are seldom of much real value to the company until they have had about 18 months experience in the industry.

How about the future development of the Wright brothers' brain child?

Well, one thing we can all count on, according to the officials polled, is that rockets and guided missiles are

going to play an increasingly-important part. J. M. Hollyday, Employment Manager of The Glenn L. Martin Company, declares: "With the advent of supersonic flight, the aircraft industry has just begun to scratch the surface of research and development, and it is reasonable to assume that advances in the fields of rockets and guided missiles will rapidly broaden our horizons."

"Today the engineering emphasis is completely changed," declares another official from the Martin Company. "Ten years ago the primary emphasis was on airframe and power plant design, and relatively little emphasis was placed on electrical and mechanical systems.

"But now the emphasis is on systems engineering, with special attention being given to electronics. Martin engineers work with all details of the three major elements: airframe and power plant; electronic flight and navigational devices; and military armament, or, in the case of commercial aircraft, passenger and cargo facilities.

"We have extended systems engineering to the design of piloted aircraft with a belief that a majority of them, in the years ahead, will more and more resemble guided missiles. Electronic devices are supplementing man's physical limitation (he was built to move at 3 miles per hour, to see and hear for only a few hundred yards, and to react in large fractions of a second) but such limitations mean nothing to electromagnetic waves that dart through space at speeds of 186,000 miles per second, regardless of weather or visibility."

Another interesting new development is reported by Northrop Aircraft, Inc. One of the latest engineering brain children which is saving money and precious time (even more important than money in the arms race with the Iron Curtain) is a "windless wind tunnel." It uses electronics instead of the usual artificial hurricane to simulate flight tests. Without ever leaving the ground, Northrop engineers use an electronic analog computer to project a life-sized hydraulic mock-up through all the maneuvers of a high-speed, high-altitude test flight. With the analog computer, information on flight performance can be obtained at a fraction of the cost of actual test flights, and, although final response data cannot be so obtained, it keeps actual test flights at a minimum.

Another interesting Northrop project is the experimental casting of magnesium wings. If the project proves successful, cast wings can be produced much more quickly and cheaply than by conventional fabricating methods. The company also notes that the use of magnesium instead of aluminum would be of great strategic value, since the supply of magnesium, produced from sea water, is inexhaustible.

In conclusion, one is left with the definite impression that the fiction of Jules Verne and Buck Rogers will shortly be outdone, if it has not already been so, by the actual accomplishments of the aircraft industry, which looks like a fertile field for engineers for many a long year to come.

Produced in a single piece, this 16-foot airplane wing section was cast from featherweight magnesium by Northrop Aircraft, with the assistance and cooperation of the Aluminum Company of America.

An *American Engineer* SPECIAL REPORT

Re: *National Manpower Council Recommendations Concerning A Policy for Scientific and Professional Manpower*

● In April, 1951, President Eisenhower, then in command of the NATO forces in Europe, but acting in his capacity as president of Columbia University on leave, established the National Manpower Council under a a grant from the Ford Foundation. The twofold purpose for which the Council was organized was to evaluate manpower problems of grave concern to the United States and to recommend policies for their solution.

The conclusions of the Council, plus a review of the facts on which its recommendations are based, have been reported directly to President Eisenhower and have now been released in the form of a book —A Policy for Scientific and Professional Manpower—published by the Columbia University Press.

The book is divided into two sections. The first,in the form of a statement by the National Manpower Council, summarizes the critical "brain power" problem facing the country and offers a fourteen-point program for private, institutional, and governmental action to meet it. The second part, which was prepared by the Council's research staff, presents a review of the data and issues upon which the recommendations were based.

Part One

The fourteen-point program which the Council suggests is as follows:

With respect to developing more reliable knowledge about our human resources, the National Manpower Council recommends that:

1. The foundations and the universities encourage and support research designed to increase our understanding of the processes of educational and career choices; and of the factors facilitating the development of talent and intellectual ability; and of the conditions contributing to superior performance.
2. Private and governmental agencies concerned with the development and utilization of scientific and professional manpower intensify their efforts to collect and analyze significant information about these critical resources.
3. The Federal government, because of its specific responsibilities and unique facilities, provide leadership for these cooperative tasks under the guidance of the Office of Defense Mobilization.

With respect to strengthening the institutions which educate and train our scientists and professionals, the National Manpower Council recommends that:

4. State and local governments, alumni, business, labor, and other interested groups and individuals intensify their efforts to provide the financial support required by the colleges and universities to improve their faculties and facilities.
5. The President appoint a commission composed of representatives of government, universities, and industry to review the impact of governmental research and development contracts upon the primary responsibilities of the colleges and universities to advance fundamental knowledge and train tomorrow's scholars and scientists.
6. Colleges and universities recognize that a dynamic society requires the kind of education and training that equips students to meet not only the demands of their first jobs but also the challenges of new tasks and problems which they will face many years later.

With respect to maintaining a continuous, large flow of students through our colleges and universities, the National Manpower Council recommends that:

7. The public continue to support the present program of deferring qualified students in order to enable them to complete their education before they discharge their obligations of military service, and the President remove dependency, except in cases of hardship, as a ground for deferment in order to insure that postponement of service does not turn into exemption.
8. The Secretary of Defense direct the Secretaries of the Army, the Navy, and the Air Force to provide sufficient flexibility in their policies governing the calling to active duty of students enrolled in Reserve Officers Training Corps programs, so that well-qualified students are permitted to pursue graduate work prior to their military service.

With respect to expanding the opportunities for capable young persons to secure a higher education, the National Manpower Council recommends that:

9. The public and its elected officials fulfill their responsibility to maintain good elementary and secondary schools by providing the financial and personnel resources necessary to remedy the present weaknesses in our educational system.
10. The schools, professional societies, governmental agencies, and other interested groups act together to strengthen the information and counseling services for high school and college students to assist them in the sound selection of schools, courses of instruction, and careers.
11. Scholarships and fellowship programs, supported by private and public funds, be maintained and expanded to help more young people of ability to acquire a higher education.

With respect to improving the utilization of the available supply of scientific and professional per-

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sonnel, the National Manpower Council recommends that:

12. The President initiate a review of the existing legislation and administrative procedures governing the recall of reservists to active duty in order to develop a system that will provide for civilian participation in determining the distribution of scientific and professional personnel required to meet military and civilian needs.
13. Management intensify its efforts to determine the most effective balance among the different types of manpower it employs—scientific and professional, technical, skilled and semi-skilled—in order to insure efficient and economical operations and to provide for the further training of the manpower for which it is responsible.
14. Business and government intensify their efforts to develop executives who understand the importance of insuring that each highly trained person has the opportunity to utilize his capacities as fully as possible.

Part Two

The second section of the Council's report is divided into twelve chapters and includes among them a historical résumé of the growth of the professions. The chapters having perhaps the greatest import for professional engineers are the two dealing respectively with "Research and Devolpment" and "The Engineering Profession."

The first of these, which states in its introductory paragraph that "Americans are just becoming aware of the fact that significant scientific and technological advances depend upon the availability of competent scientists and research engineers," deals with the meaning, scale (dollarwise), and growth of research and development and discusses the role of government, industry, and the universities in this field. Future propsects for research and development are also treated with emphasis on the scale of governmental support to be expected in the program. It is pointed out that the estimates of research and development progress in Soviet Russia will be a major factor affecting U. S. Government expenditures in this field.

The report takes note that the "team approach" is coming increasingly into use in applied research so that the best efforts of all the engineers and scientists concerned can be most effectively utilized. The Council also calls attention to the fact that "the American people have been blind to the fact that their progress depends to a very great extent on the work of less than 15,000 men who are spending their lives in fundamental scientific research, most of them at universities." Great care must be taken, therefore, it is asserted, to insure that the universities will be able to continue to meet this major responsibility of discovering new knowledge.

The chapter on "The Engineering Profession" is a comprehensive assessment of the profession as it is today, and studies by NSPE are cited as having provided useful data. Characteristics of the profession, its subdivision into various branches of specialization, and the percentage division of engineers in selected branches are among the subjects covered.

The chapter includes a thorough discussion of the demand for and supply of engineers; and the need for the better utilization of professional engineering manpower and an adequate supply of supporting technicians is pointed out.

There are two particularly important characteristics of the demand for engineers, the new book states.—"First, it is a demand for men to perform a wide range of different functions from top management to routine testing. Second the demand is subject to wide fluctuations." The over-all demand varies, says the report, with business conditions, while the demand for specific types of engineers fluctuates with such developments as the growth of new industries or the institution of new processes. Particular attention is given to "industry's increasing preference for engineers for managerial functions;" and reference is made to a recent study of college graduates* in which one-third of those who specialized in business administration reported they wished they had majored in some other field, with engineering as the one most frequently mentioned.

While the outbreak of Korean hostilities brought an accelerated demand for more engineers than were available for hiring, the report also calls attention to the fact that in 1949 there was considerable concern about employment prospects for new engineering graduates as the post-war employment boom had begun to decline. It is far from certain, the chapter states, that the demand for engineers will continue indefinitely at its present very high rate. It can be expected to level off somewhat, or perhaps even decline slightly; but it probably will not fall significantly unless there should be a strong recession.

The relation of education to advancement in the profession, salaries, the prospects for an upswing in the number of engineering graduates after 1954, and recent trends in engineering school curricula are among the other topics touched upon in the chapter.

Part Two of the Council's report also includes data on the Armed Forces' use of manpower, further material on shortages and on higher education, information on the current status of physicists, teachers, and physicians, and an analysis of "Manpower Policies in a Democratic Society."

James D. Zellerbach, president of the Crown Zellerbach Corporation, San Francisco, is chairman of the National Manpower Council, and Phillip Young, the chairman of the U.S. Civil Service Commission, is deputy chairman. Eli Ginzberg and Henry David, both of Columbia University's Graduate School of Business, serve as director of research and executive secretary respectively.

*They Went To College, by Ernest Havemann and Patricia West.

This is a section of a Roman aqueduct built in 80 A.D. The complete aqueduct extended 56 miles underground between Eiffel and Cologne.

THE SMITHSONIAN SPOTLIGHTS THE ENGINEER

• *An American Engineer Photo Story* •

A Visual History of Engineering Is On Display at Washington's Famous Smithsonian Institution.

Whenever someone mentions the Smithsonian Institution, the man-on-the-street's reaction is apt to be somewhat like, "Oh, that's the place down in Washington, D. C., where the Wright brothers' airplane is suspended from the ceiling." Or, "Isn't that the museum where the First Ladies send their inaugural gowns? Seems to me they have them all the way back to Martha Washington."

Both of these observations are, of course, correct, but they fall far short of the complete picture. For one thing, a tour of the exhibits assembled in the Arts and Industries and Aircraft Buildings offers a practical, visual presentation of the highlights of engineering history in the United States with many side glimpses at early engineering accomplishments around the globe.

The present structures are literally bursting at the seams with engineering memorabilia, from a "one-hoss shay" to the *Bell X-1*, the first piloted airplane to crack the sonic barrier, from a section of a Roman aqueduct, circa 80 A.D., to a scale model of the U.S.S. Missouri in the Naval History Museum. And Frank A. Taylor, head curator of the Department of Engineering and Industries, is quick to point out that the public exhibits, extensive as they are, represent only a fraction of the material the Smithsonian has to offer to the serious student of engineering history—or the novelist who wants to incorporate an accurate description of an early piece of machinery in his latest book. Many reference collections are available "backstage" for researchers interested in studying the fine points in the evolution of the working models on display, and there are numerous laboratories, study rooms, and shops that the casual visitor never sees in his tour of the main halls and galleries.

The Smithsonian Institution, which includes in its jurisdiction such diversified elements as the National Zoological Park and the National Gallery of Art as well as the engineering and industrial exhibits, is an Establishment, created by an 1846 act of Congress. It owes its origin to the bequest of James Smithson, an English scientist, who was at one time a prominent member of the Royal Society of London. When he died in Genoa, Italy, in 1829, he left his entire estate to the United States of America "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men."

On July 1, 1836, after considerable debate Congress approved a bill authorizing President Jackson to claim the legacy; and, by 1838, the friendly suit had been settled in the London courts. The bequest amounted to over

It was an unusual bequest in the will of James Smithson, pictured here, which gave the Smithsonian Institution its start. To establish it, the Englishman left the United States more than a half-million dollars—a great fortune in 1829.

a half-million dollars which, while little enough today, was actually considered an immense fortune in the early part of the nineteenth century. It was, in fact, greater than the endowment of any existing institution in the country with the single exception of Harvard University.

Under the 1846 statute, the "Establishment" consists of the President of the United States, the Vice President, the Chief Justice, and the members of the President's Cabinet. The actual business of the Establishment is administered under a Board of Regents, composed of the Vice President, the Chief Justice, three Senators, three Representatives, and six citizen members, two of whom must be residents of the District of Columbia with the remaning four being from different States and no two from

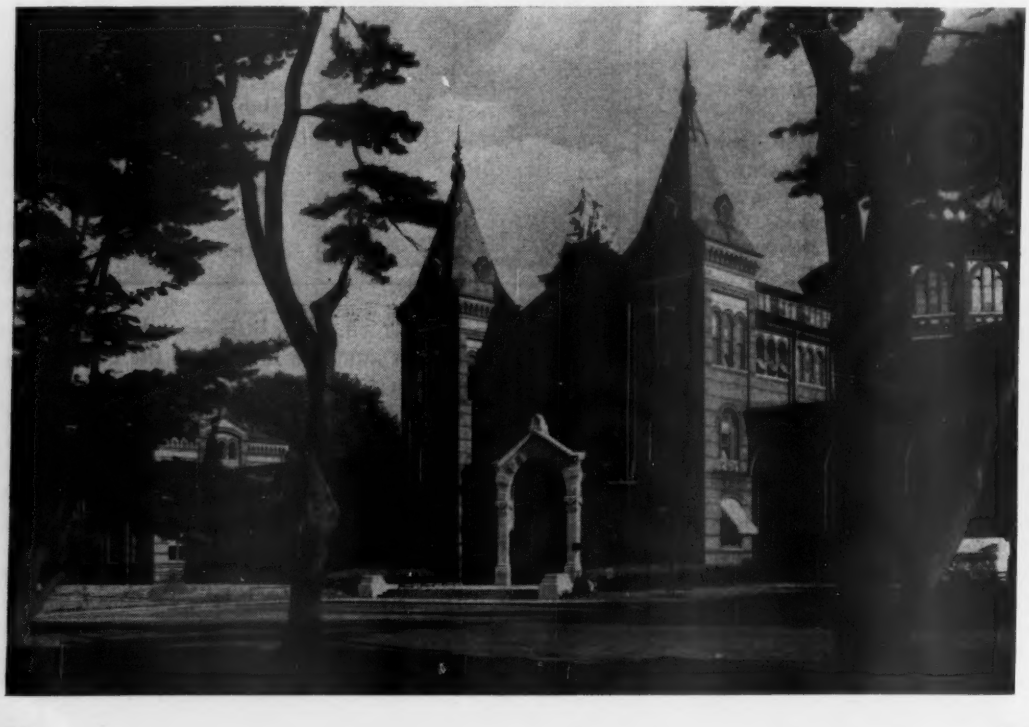
Below is Elihu Thomson's original electric welding machine, an 1886 invention. At the right is the original vacuum pan used by Gail Borden in 1853 for condensing milk. These are among the many inventions that revolutionized industry and are now carefully preserved at the Smithsonian.

the same State. The executive officer of the Institution serves as Secretary both of the Establishment and of the governing Board.

Through the years the Board of Regents roster has included many prominent names, with such famous men as Louis Agassiz, General William Tecumseh Sherman, and Alexander Graham Bell counted among the members. The President of the Confederacy, Jefferson Davis, also once served as a Smithsonian regent when he was a United States Senator. The first Secretary of the Institution was the distinguished Princeton physicist, Joseph Henry, whose name in the term, *henry*, has been given to the standard unit of electrical induction. The present and seventh Secretary is Dr. Leonard Carmichael, past president of Tufts College and an eminent psychologist.

The Department of Engineering and Industries, headed by Mr. Taylor, has its roots in such old and varied activities as the U. S. Exploring Expeditions of 1838-1842 and the accumulation of physical apparatus left by Smithsonian researchers. Its future is directed toward a full-scale development into a National Museum of Engineering and Industry within the Smithsonian family.

Meanwhile there is much to be studied and appreciated already on display—far too much to be catalogued in any one article or even in any one volume. The salient fact, however, is that no one, not even the most desultory tour-



Here is pictured the Arts and Industries Building of the Smithsonian Institution, which houses many outstanding engineering exhibits. Today, even more room is needed for the Institution's treasury of technical collections.

ist, can pass through the museum without being made acutely aware of the vital role the engineer has played in making our civilization what it is today.

How far along the road to progress would we be without the dynamos, transformers, electric motors, refrigerating units, and diesel engines that the engineer has either invented himself or put into mass production, or both? What would fire fighters do in a large, modern industrial city if they had to depend on such antique equipment as the "Lily of the Swamp," a hand-drawn steam fire engine that was used in the 1870's in Frederick, Maryland?

It took good engineering to spark the industrial revolution, and this is well spotlighted by such Smithsonian exhibits as the scale model of James Watt's "Old Bess" and the original John Stevens steamboat boiler and engine. And nowhere is the continuing importance of the engineer today more apparent than in the exhibits that show modern industrial processes from the vulcanization of rubber to the condensation of milk.

How engineering took the textile industry out of the home and put it in the factory is mutely illustrated by the displays from spinning wheels to power looms. And to realize how it has actually created the modern office, all one needs to do is to study the Patent Office models of early typewriters and calculating machines.

What the engineer has done for transportation is underlined throughout the museum. There are models of old full-rigged whaling steamers and a 17th century merchant ship of the *Mayflower* type, contrasting sharply with models of modern cargo vessels and such later passenger ships as the *Mauretania*. The oldest complete locomotive used in America—the "John Bull"—is on display. The automotive section features the cars of such early manufacturers as Duryea, Franklin, Knox, Stanley, and Winton and the granddaddy models of such still-familiar automobiles as Fords, Oldsmobiles, and Cadillacs. The history of man's efforts to fly is on record at the Institution, too, the aeronautical collection (since 1946 designated as the National Air Museum and not actually a part of the engineering department) being recognized as one of the foremost in the world. There are such familiar names as the *Spirit of St. Louis*, the *Winnie Mae*, and the *Chicago*, plus historic planes of World Wars I and II. One seaplane on display is the Army-Curtis R 3C-2 Racer in which a Lieutenant James H. Doolittle won the 1925 Schneider seaplane race.

Above is the *Bell X-1* which Captain C. E. Yeager piloted through the sonic range on October 14, 1947.

All of these and many more exhibits have been made possible because of the work of the man behind the scenes —the engineer. At the Smithsonian Institution, at least, he has been accorded a fair measure of the recognition he deserves.—***End.***

This Winton auto was the first to be driven across the United States. The trip was made in 1903.

Here Is Your Annual Meeting Story . . .

Important Decisions Made In Daytona

The Nineteenth Annual Meeting of the National Society of Professional Engineers, held in Daytona Beach, Florida, June 18-20, was one of the most outstanding in the history of the Society to date. Progressive action on many important professional problems was taken by the nearly 500 engineers who assembled for the event at Daytona's Sheraton Beach Hotel, where the conference was arranged by the members of the Florida SPE in conjunction with their own annual meeting.

The three-day convention, over which NSPE President John D. Coleman presided, was preceded on June 17 by a day-long Executive Committee conference during which the scheduled program for the Daytona assembly was reviewed, and recommendations were made and action taken for subsequent Board of Directors ratification.

The Honorable Jack Tamm, Mayor of Daytona Beach, delivered a welcoming address at the opening session of the regular meeting on June 18; and the president's, treasurer's, and executive director's 1952-53 reports were also presented at this time.

The professional sessions, during which problems and policies relating to public relations, registration reciprocity, engineering ethics, education, employment practices, salary and fee schedules, legislation, national defense, dues adjustment, chapter activities, and many other topics were thoroughly considered, were interspersed with a series of social and entertainment events for those in attendance. The first of these was an evening Fellowship Hour in the Sheraton Beach's Ocean Room on June 18. A barber shop quartet provided additional entertainment at this time, and Past President L. L. Dresser also showed pictures and gave an account of his experience as an observer at the Yucca Flats atomic explosion.

The Regional Breakfasts on Friday morning presided over by the respective Vice Presidents gave the P.E.'s a chance to renew old acquaintances and at the same time give serious consideration to problems and professional items of concern primarily to their own home areas. A trip to world-famed Marineland, golf at the Ellinor Village Country Club, a visit to the Ponce de Leon Springs, and a fish fry were other social events provided during the second day of the meeting. A special program for the ladies was also included in the meeting schedule.

Members of the Florida State Board of Engineer Examiners—Sam P. Turnbull, President; Joseph Weil, Secretary; Wylie W. Gillespie; J. Wylly Keck, and Oliver J. Semmes, Jr.,—were guests of honor at the June 18 luncheon meeting, at which Mr. Weil, who is also Dean of Engineering at the University of Florida, spoke on *Carrying on the Profession's Responsibilities through Industrial Research.*

Other outstanding addresses made during the course of the conference were those delivered at the Saturday morning session as follows: *Programs for Professional Advancement* presented by Alex Van Praag, Jr.; *NSPE's Development of Professional Objectives* by Perry Ford; *The Professional Development of Engineers and Scientists in Industry* by Clark Ransom; and *The Place of Registration in Professional Development* by Karl B. McEachron. A report on *Unity—NSPE and EJC* was also given at this time by Vice President Clarence T. Shoch.

Dr. Frank Goodwin, professor of marketing at the University of Florida, was the guest speaker at the Saturday luncheon; and President John D. Coleman delivered an address on *The Challenge to NSPE* at the afternoon session.

The culmination of the meeting was reached at the Saturday evening banquet when T. Carr Forrest, Jr., of Dallas, Texas, the incoming President, and other officers were installed for the 1953-54 administrative year. The Vice Presidents for the new term are: Edwin W. Seeger, Milwaukee, Wis.—Central Area; Clarence T. Shoch, Allentown, Pa.—Northeastern Area; N. W. Dougherty, Knoxville, Tenn.—Southeastern Area; Christopher Y. Thomas, Kansas City, Mo.—North Central Area; Alfred J. Ryan, Denver, Colo.—Southwestern Area; and Orland C. Mayer, Boise, Idaho — Western Area. Paul H. Robbins of Washington, D. C. and Russell B. Allen of College Park, Md., were also again installed as Executive Director and Treasurer, respectively.

Presentation of the NSPE Award, which has been accorded to Charles F. Kettering, General Motors Vice President and world-renowned research engineer, was also made during the banquet. Mr. Kettering was unfortunately unable to be present for the occasion; so the award was accepted in his name by T. A. Boyd, a General Motors research executive, who gave an address on the contribution of engineering to scientific research and technology.

A special Outstanding Service Award was presented to Joe B. Butler, professor of civil engineering at the Missouri School of Mines, Rolla, Mo., and a member of the MSPE, in recognition of his successfully bringing sixty-four new members into the Society and his research on the unionization problem.

Entertainment during the banquet was provided by the Bethune-Cookman College Choir.

Stanley Warth is the President of the Florida SPE, the host Society. Jules P. Channing served as general chairman, George B. Hills as finance chairman, John E. Kiker, Jr., as program chairman, and W. M. Bostwick as local chairman in Daytona. Local arrangements committees included: Hugo Quillian and B. N. Wilson—speakers and guests; W. M. Bostwick and J. G. Moore—registration; C. H. Moneypenny and D. W. Wiggert—finance; H. D. Briley and Byron Rothert—hotel arrangements; Q. L. Hampton, V. G. Stepp, and J. F. Kapinos—entertainment; C. H. Moneypenny—publicity; and Mrs. J. G. Moore and Mrs. C. H. Moneypenny—ladies' program.

Important action taken by the Board of Directors during the course of the meeting was as follows:

Annual Report

The budget was revised to provide funds for a report covering NSPE activities for the 1952-53 administrative year to be distributed to each member.

Mr. T. A. Boyd, left, General Motors research executive, receives the NSPE Outstanding Service Award for Charles Kettering, GM Vice President, who was unable to attend. NSPE President John D. Coleman makes the presentation.

Legislation

Policy on Engineer-Reservists: The Board adopted a policy calling for a joint military-civilian board to establish high-level government policy to bring about an effective balance between the needs of industry and of the military services with respect to professional engineers and other specialized personnel in the military reserve.

Niagara River Power Development: The Board approved a New York resolution that the Niagara River power development should be by private enterprise and also reaffirmed a previous policy favoring private enterprise in the development of natural resources.

Tax Deduction for Educational Expenses: Support was voted to proposed legislation allowing educational expenses for professional persons as deductible items in income tax computation.

Taft-Hartley Act: A proposal to exempt licensed professional persons from the provisions of the Taft-Hartley Act was discussed, and the question was referred to the Legislative and Employment Practices Committee.

The Board also indicated approval of the NSPE-backed "Freedom of Association" bill, referring to professional engineers.

Social Security: It was directed that a poll be made of self-employed professional engineers in order to obtain their views concerning inclusion under social security.

Employment Practices

Special Committee: It was voted to establish a special committee to consider the problems of professional engineers employed in industry.

Gentlemen's Agreement: The directors were called upon to obtain information and opinions concerning agreements in industry restricting engineer employees from discussing new employment with other employers in the same industry without prior clearance from their current employers.

Registration

The Registration Committee offered eleven specific suggestions to foster registration among engineers and implement registration procedures.

Interprofessional Relations

The Board accepted the "Interprofessional Code of Practice" adopted by the Massachusetts SPE and the Massachusetts State Association of Architects for dissemination to chapters and State Societies and for study on the desirability of adopting the code as a national standard of practice.

Unity

After extensive background discussion, it was decided that there were too many still unresolved problems to warrant acceptance, at this time, of the Engineers Joint Council invitation for NSPE to join the group. The Board then called for representatives of NSPE to offer to meet, as soon as possible, with representatives of EJC to discuss new approaches to unity of the engineering profession.

Public Relations

The Committee's report reviewed public relations progress, pointing out the value of the first two Executive Research Survey Reports and outlining plans for the future. It also summarized 1953's successful National Engineers' Week promotion, and approval was given for the 1954 observance from February 21 to 27.

Ethical Practices

The Committee was requested to give further consideration to the revision of the Professional Engineer's Creed, and the possibility of establishing a permanent Board of Ethical Review was discussed.

Dues Adjustment

It was voted to increase the annual dues so that, effective January 1, 1954, they will be as follows:

P.E. members	$10.00
E.I.T. members	$ 4.00
Members-at-large	$15.00

Education

The Board heard the Committee's report urging particularly that: (1) the most able engineering students be encouraged to continue their study beyond the four-year undergraduate program; and (2) industry examine ways and means for cooperation with engineering educational institutions in strengthening their staffs.

A resolution was also adopted urging all accredited engineering schools to designate their registered P.E. staff members in their catalogues and other publications.

Membership

A review was made of the 1952-53 membership program, and it was suggested that State Societies and Chapters concern themselves with retaining delinquent members. A state-by-state analysis of the membership increase (almost 3,000) was also presented.

Further, a policy was adopted to establish a waiver of dues upon approval of the State Society for members 65 years of age who have also belonged to the Society for at least 15 years.

Salary and Fee Schedules

Grade Schedule: Final approval was given to the schedule of grades without national minimum salaries.

Salary Survey: The recent Salary Survey was reviewed, and preliminary results were discussed. The Board also acted to approve conducting a similar survey at least once every two years.

Chapter Activities

The Committee outlined results of the survey on the Chapter Handbook and indicated revision and republication.

Roster Committee

The Committee reported that its survey shows State Societies favor the publication of a national roster. Problems in connection therewith include advertising potential, financing, and distribution.

Insurance

The Board approved a recommendation for the establishment of a retirement plan for headquarters office employees, the details to be developed by the Committee subject to the approval of the Board.

NSPE Headquarters Building

A Building Committee was authorized to negotiate, with the approval of the Executive Committee, an option for a lot suitable for an NSPE headquarters building in Washington, D. C.; the Committee being instructed to submit details on costs and other factors in connection with appropriate construction for approval by the Board.

Succession of Vice Presidents

As required by the Constitution, the Board selected the order of Vice Presidents to head the Society if the President should be unable to perform his functions. The order is: (1) Clarence T. Shoch, (2) Dean N. W. Dougherty, and (3) Edwin W. Seeger.

Future Board Meetings

Voting to resume the policy of holding three Board meetings per year, the Board adopted the following schedule:

November, 1953 ....Indianapolis, Ind.
February, 1954 .....New Mexico
(city to be set later)
Fall Meeting, 1954..Omaha, Nebraska

The next annual meeting, which had been previously scheduled, is set for Milwaukee, Wis., June 9-12, 1954.

ENGINEERS

Recent promotions within our organization to executive engineering positions have created additional opportunities for experienced engineers in fields of:

MECHANICAL
ELECTRICAL
ELECTRONIC
STRUCTURAL
AERONAUTICAL

If you are not satisfied with your progress in other types of endeavors, we invite your inquiry regarding a challenging future with America's oldest active aircraft company.

EXCELLENT EMPLOYEE BENEFITS
CONVENIENT HOUSING

Appointments for personal interviews may be arranged.

THE GLENN L. MARTIN CO.
303 Technical Employment
Baltimore 3, Md.

Martin

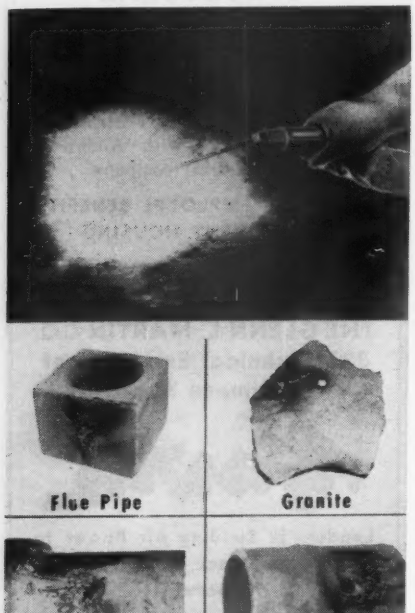
Leaders in Building Air Power to Guard the Peace, Air Transport to Serve It

Developers and Manufacturers of: Navy P5M-1 Marlin seaplanes • Air Force B5-7A Canberra night intruder bombers • Air Force B-61 Matador pilotless bombers • Navy P4M-1 Mercator patrol planes • Navy KDM-1 Plover target drones • Navy Viking high-altitude research rockets • Air Force XB-51 developmental tactical bomber • Martin airlines • Guided missiles • Electronic fire control and radar systems.

- - NEW PROCESSES - -

Eutectic Announces Stone Cutting and Melting Arc-Torch

A new, patented process for cutting and piercing stone, cement, concrete and refractory materials, trade named "DynArc," has just been announced by the ChemoTec Division of Eutectic Welding Alloys Corporation.



This event ushered in a new era. An arc rod was used for the first time upon non-conductive material and without a ground connection. These characteristics represent the technically "impossible"; they defy the textbooks, according to the manufacturer. Rock is pierced and liquid stone pours out of the hole, they state.

The Dyna-Trode creates its own arc. It requires no ground and it does not have to be struck upon metal. The operator has complete control at all times and he alone determines when and where the arc will start. This is not the only departure from the conventional. The arc, which will operate in mid-air as well as it will upon stone, resembles a flame in appearance. It has all the characteristics of a super torch flame from 5 to 8-in. in length. Technically, DynaTrode is a self energizing arc rod.

Wherever a DC welding machine is available of 400 amp. or more capacity, the Dyn-Arc process may be used. The multiplicity of equipment associated with high temperature and pneumatic cutting and drilling was conspicuously absent. No compressors, air lines, oxygen tanks, pneumatic drills, etc., are necessary. A conventional welding machine and a supply of DynaTrode rods are all the equipment required.

The portability and adaptability are distinctive features duplicated in no other product. The properties are all incorporated into one slender rod. The results obtained with this pencil-like rod, weighing but a few ounces, are only obtainable by conventional means when large quantities of heavy equipment are brought into operation.

For further specifications, technical data, etc., write ChemoTec Division, Eutectic Welding Alloys Corporation, 40-40 172 Street, Flushing, N. Y., New York.

Honeycomb Carving

U. S. Propellers, Inc., have developed a technique for carving honeycomb material. Complex contours, tapers and twists are carved by machine operation to aircraft airfoil tolerances. For the first time, design engineers can now schedule components for aircraft in compound contours and extremely odd shapes which have never before been available in skin covered core design and construction. Several aircraft honeycomb contracts for special contouring and special bonding are now in process.

The carving processes developed by U. S. Propellers can be done in wood or aluminum bar stock, or aluminum forgings to fabricate such items as a rotor blade spar having a contour, taper and twist. Fabrication of cellulose acetate blocks in contours for backing up wing tanks; or aluminum or other solid substance materials to be highly contoured, is easily accomplished by carving.

The use of such honeycomb sandwich construction permits use of a much lighter gage skin. Core size can be selected for any particular application.

The versatility of this type of fabrication permits covering in glass cloth, plywood, aluminum, or steel sheets, or practically any other material. In the case of fairly stiff skin coverings the carving is done so that the core itself meets all points of a pre-shaped skin. Write U. S. Propellers, Inc., 3270 East Foothill Blvd., Pasadena, Calif.

Engineers' Opinion Upheld in Ohio Turnpike Case

A recent decision of the Ohio Supreme Court sustains the principle that administrative bodies may rely upon the expert advice of professional engineers, and also illustrates the effective interest and intervention of state societies in public issues.

The case arose out of a decision by the Ohio Turnpike Commission to limit bids on the road material to Portland cement after a review of tests and analyses by the engineers of the Commission and the engineering consultants. Producers of other types of road material objected and filed suit to require the acceptance of bids on alternative types of surface material. The State Court of Appeals ordered new plans and specifications be prepared for this purpose and an appeal was taken to the Supreme Court.

The Ohio Society of Professional Engineers intervened as a "friend of the court" to argue the principles involved relating to professional services but without engaging in the dispute as between the value of different materials. "The Professional Engineer is vitally interested in and concerned with the outcome of this litigation because on all public works projects in Ohio it is his professional opinion and recommendation on points of engineering design and specifications upon which administrative officials make their final decisions," the Ohio Society brief stated. "By custom, usage and necessity these professional opinions are relied upon by administrative agencies of the various political subdivisions of the State and account, no doubt, for the absence of specific statutory provisions respecting bidding requirements as to design and specifications on public works projects generally."

When the Turnpike Commission decided upon one type of material it was relying upon the judgment of its professional engineers in precisely the same manner that similar administrative officials of all political subdivisions in the State have acted for many years, the Ohio Society argued. "If the decision of the Court of Appeals is sustained it will mean that all public works projects wherein alternate bids are not required will be subject to attack regardless of the recommendation of the professional engineers." This would result in an over-abundance of caution by administrative agencies and would mean

(*Continued on page* 41)

THE PUBLIC AND THE ENGINEER

By James D. Mamarchev, P. E.,
Consulting Engineer, Houston, Texas

"WHAT'S engine, Daddy?", asked my three-year-old daughter, errupting the bed-time story about "The Magic Chu Chu Train" I was reading. It took a little time to explain that it was the engine which pulled the train and made it go. Obviously satisfied, next she asked: "And what's engineer?" Apparently my answer this time could not so well please the child because she kept repeating her question. She had heard of some of her father's friends visiting the house being referred to as engineers but she had seen no one of them drive an engine.

This incident brought to memory the same question I asked my father at the time of entering high school. I still remember the old man's slow answer. Translated into English it meant: "An engineer is one who loves figures and excels in numbers; he studies and trains himself how to apply them as his own language in order to make useful things out of the physical world for the benefit of his fellow-men as cheaply as possible. Our Lord has endowed such a man with the talent to create things, first in his mind, and then in actual reality. In this way the engineer has cultivated within himself a few of the powers of our Maker, the One who was and will remain the Greatest of Engineers."

The parental hint of the necessity to study was clear. His answer was so realistic and pictorial that it was sufficient to fire the imagination of any young man who likes to delve in figures and make useful things.

There was, however, another magic spell in his answer. It was the resolute sound with which he pronounced in French the word "INGENIEUR" (meaning "engineer" in English). It was clear that "ingenieur" was derived from the French words "INGENEU" (ingenious) and "GENIE" (genius), which in turn describe one "possessed of an extraordinary mental capacity to create and bring forth things," according to Webster and other authorities.

There could be little doubt that the word description of the work done by a certain class of men has an effect upon the public's regard and esteem of what their relative value is to the good of the community or of the nation. While it is true that in the making of a people's language it is the public who coin words, particularly, in the realm of slang, it is the learned classes of a nation consisting of educators, scientists, professionalists, writers, administrators, statesmen and others, who contribute to its vocabulary, especially in the forming of new words for novel things that appear in human life from time to time. When they have failed to choose better but adopted the slang form of what might be someday an important word in the life of the nation, this eventually may result in injustice being done not only to the class of people that word is meant to designate but also to the nation to which these men belong.

A brief look into the history of engineering of known record since the dawn of civilization may throw some light on how engineers were referred to. As most of early history deals with military efforts and war, it is in these that one can trace facts of record. The earliest which refer to China, Egypt, Persia and the Empire of Alexander of Macedon, throw no clear light on the subject. Julius Caeser, however, in his "Commentaries" specified the duties of his "Praefectus Fabrum" as his chief officer of a "road construction labor gang" attached to a group of his legions in connection with the War in Gaul and in the invasion of Britain, in the year 54 B.C.

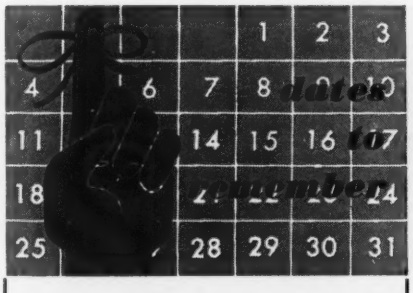
It appears that during the glorious days of the Roman Empire the Latin word "Ingeniarius" was used to describe the occupation of one who was designing useful works and engines. Another conqueror of Britain, William the Conqueror, had appointed Waldivus to the position of Royal "Ingeniator," according to the "Domesday Survey" of 1086 A.D. This was the designation of the King's chief officer of construction of war engines and defenses. This is probably the earliest recorded English word known to describe the occupation of an "engineer" and this must have been also the Latin word for "engineer" at that time because it originates from the Latin verbs "GENERE" or "INGIGNERE" which means "to create" or "bring things forth."

It was from these Latin words that the French words mentioned above, GENIE, INGENUE, and INGENIEUR gradually evolved. Also from the same Latin root originates the Latin word "Ingenium" which means "Engine" in English and "Engin" in French, each of these three words describing a "machine" or "mechanical tool."

The Norman conquest of England by William the Conqueror left deep marks in the evolution of the language of the natives. English became a mixture of French and Teutonic tongues. The people gradually coined their "anglicized" words. It took centuries to come to the English language of today. In the case of the evolution of the modern English word describing the occupation of a man who "creates" and "brings forth" material things, from the first one recorded, "INGENIATOR" to its present day form "engineer," it took almost eight hundred years of trial and change. During that time this word appears in the records of English literature as: "Ingigner," "Engignier," "Engigneor," Engyneour," "Engineur," etc., etc.

It was in 1787, however, that the then King of England founded "The Royal Engineers Corps" which consisted of commissioned officers such as military engineers, sappers, miners,

(*Continued on page* 36)

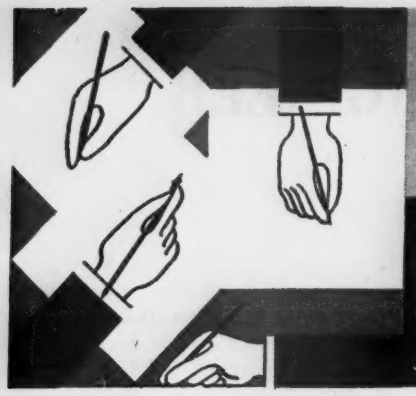


(EDITOR'S NOTE: *All those desiring to list their meetings under Dates to Remember should send* COMPLETE *information, including date and place, directly to the American Engineer.*)

New Jersey Society of Professional Engineers — Semi-annual Meeting and Shore Dinner, September 12. Old Orchard Country Club, Eatontown, New Jersey.

West Virginia Society of Professional Engineers—Annual Meeting, September 25, 26. Daniel Boone Hotel, Charleston, West Virginia.

National Council of State Boards of Engineering Examiners—Annual Meeting, October 29, 30, 31. Plaza Hotel, San Antonio, Texas.



Professional POSTSCRIPTS

In—Professional Postscripts—we have a forum for the expression of outstanding professional opinions from all over the country. Here H. W. Phillips, P.E., a member-at-large from Paducah, Kentucky, offers some very cogent thoughts on professional freedom to contract.

—PP—

Increased recognition of human values is a prerequisite to better living. As a technological society develops in any country it inevitably produces a varying amount of temporary industrial displacement and unemployment. This in turn brings about a problem of proper utilization of human values, particularly during transition periods.

No perfect solution to this problem has been found. From the point of view of the Professional Engineer, it is believed that the best solution to this problem lies in the basic freedom of the individual to contract about his affairs and to negotiate for his job in a free competitive market at any location of his choosing.

When a person's commitments are completed he should proceed to negotiate a new assignment using his newly acquired asset of experience to better himself. Complete loyalty to a particular employer until commitments with him are completed is essential to sound professional ethics. However, when duties are completed they should be closed out, and the individual should proceed to make new business and professional obligations. If his old employer or client has suitable additional work of proper caliber that he can do, it would usually be mutually advantageous to remain and render additional services to his old employer. If not, then new commitments should be made elsewhere to avoid his becoming a "loyal burden" on the old employer and a hinderance to his own professional advancement.

One of the greatest freedoms that the Professional Engineer has is to plan and carry out his professional activities through exercising his basic freedom to contract with employers or clients about his affairs in a free competitive market.

—PP—

The fact that the professional outlook is becoming more and more meaningful to young men studying engineering is pointed up in the following commentary written by Gene Brewer, Oklahoma Agricultural and Mechanical College, as a student member of AIEE. Mr. Brewer's judgment is indeed professional, and his estimate of engineering as a profession is worthy of note.

—PP—

Engineering is considered a profession by everyone who calls himself an engineer. However, many of these same people treat engineering as though it were a trade. Perhaps it would be wise to explain the duties that our professional status demands. Only by meeting the necessary requirements for a professional status may we raise the standards of engineering . . .

A profession differs from a trade in many respects. I believe that there are two main and essential differences. First, a profession is governed by the members within that profession, and, secondly, the members of a true profession have a duty to perform, a service to be rendered.

Since the leadership and guidance for a profession must come from the rank and file engineer, engineers must understand in general the principles of a profession and the consequences thereof.

Doctors have their oath of Hippocrates, lawyers their Canons of Ethics, and ministers their Bible. What have engineers developed over the years to give them moral guidance along with their technical excellence?

It is my belief that every major technical society has in existence today a code of practice based on a pattern of ethics. In 1946 the National Society of Professional Engineers adopted Canons of Ethics for Engineers.

After reading the Canons of Ethics, you cannot help but be impressed by the scope and depth of the principle outlined therein. This straightforward document hits straight to the heart of the Golden Rule.

One might reason ethics have little to do with the art of designing an economical and efficient alternator or the correction of a low power factor on an electrical network. However, if you look behind each of these tasks and see the primary purpose for the accomplishment of each, you will see that we as engineers have a public duty connected with our work. It is our moral obligation to perform work for the general public at a reasonable cost and at the same time maintain adequate standards of construction . . .

N. W. Dougherty, Dean of Engineering at the University of Tennes-

(*Continued on page* 41)

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BY PAUL H. ROBBINS, P.E.

Executive Director

N.S.P.E.

AS the Republican Administration has taken over the reins of our Federal Government and has endeavored to trim the Federal Budget, the difficulties involved have impressed the public at large with the fact that Government has become an activity of tremendous size, affecting many facets of our everyday lives. Correspondingly, as our living has become more complex, engineers have become aware of the increasing importance of Government in their lives because of their responsibility in the technical development of our national economy and their increasing assignment to managerial and administrative responsibilities.

A recent review of the organization of the Federal Government has shown that most of the Federal agencies have at least some activity in which the engineering profession has an interest. These range from such obvious activities as those of the Corps of Engineers, Bureau of Reclamation, and Bureau of Public Roads, to those of regulatory bodies such as the Office of Defense Mobilization, the National Labor Relations Board, and similar agencies.

It is quite logical, therefore, that one of the major activities of the National Society of Professional Engineers should be concerned with Governmental liaison. This liaison actually has three phases: the first phase is in the enactment of laws themselves where a constant vigilance must be maintained concerning the legislative changes proposed and an evaluation made of their effect on the engineering profession; the second phase is in the development of interpretations and regulations by the executive arm of Government which is charged with the administration of these laws; and the third phase deals with the particular interpretations of these regulations as they are administered daily.

Realizing that these three phases are developed and evaluated at the local and state levels as well as at the national level, the organization of NSPE is particularly well adapted to be of service not only to its members but also to those charged with the responsibilities of Government. It was undoubtedly with this thought in mind that the headquarters of the National Society was established at the seat of the Federal Government.

It has been said many times that the hallmark of a profession is public service. Correspondingly, the success of an organization is dependent upon its service to its members. These two items, therefore, must be the guiding principles behind the Governmental liaison function of a professional society such as NSPE. Its activities should fall properly into three categories:

1. As a source of information for Government.—It can be appreciated that while Government is sometimes felt to be an abstract thing, actually it is made up of individuals. Certainly professional people are aware of the fact that there are far too many complex things in our way of living to make any one individual an authority on all things. It is logical, therefore, that Government administrators and legislators need the assistance of various groups who can supply specific information or secure the opinions of those whom they represent on special problems. It is this public service which an organization such as NSPE can supply.

This is accomplished by the appearance of representatives of the Society before Congressional committees, staff contact with various Federal officials, and the accumulation and maintenance of up-to-date information which can be made available on request to interested Governmental officials.

2. As an information-gathering source for the Society's members.—This is a continuing job which again requires contact with various sources of information and the distribution of the data to interested members. The Legislative Bulletin of NSPE serves this purpose in endeavoring to report Congressional matters as well as administrative decisions of the Government of interest to the engineering profession. In addition, its statistical and regulatory information is gathered from various agencies of Government which collect such data for the public.

3. As a source of direct assistance on specific items of interest to members and, sometimes, nonmembers.—Here the Washington office of NSPE is of assistance not only in tracking down regulations, getting information, and securing data, but also in providing facilities in Washington for members who have specific business with the Federal Government.

There is also a wide field of assistance to other organizations, since many times they have interests on which information gleaned by the organizations of the engineering profession will be helpful.

Because of the importance of Governmental liaison, the professional society can continue its history of public service by its assistance directly to Government and, in turn, to its members who will be better informed, better governed, and better citizens because of this activity.—***End.***

With Our Members . . .

New Mexican Rally

Engineers Turn Out En Masse to Hear T. Carr Forrest, Jr., in Albuquerque

NSPE's new president, T. Carr Forrest, Jr., of Dallas, Texas, was the honored guest and featured speaker at a recent Albuquerque dinner meeting sponsored jointly by the New Mexico Society of Professional Engineers and its Albuquerque chapter.

President-elect at the time of the banquet, Mr. Forrest was invited to discuss *Unionism and Professionalism*, and some 372 member and nonmember P. E.'s turned out to hear him at the Albuquerque Fez Club. Following the delivery of his address, he answered many written questions concerning the engineering profession and the National Society that were collected among the audience.

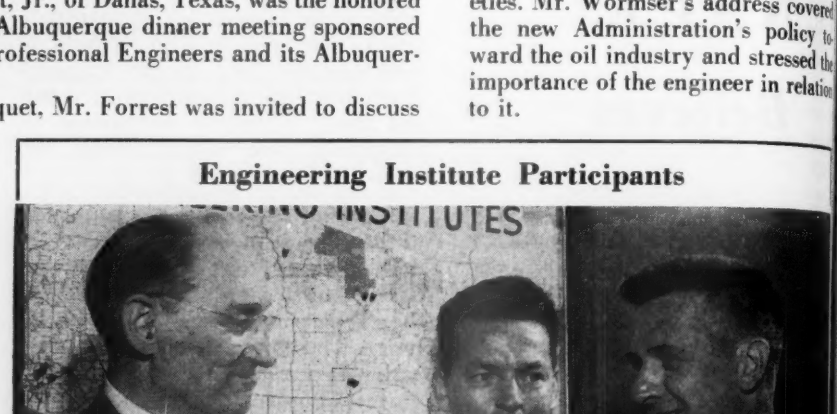
The dinner was preceded by a fellowship hour, and additional light entertainment was provided by local NMSPE members. The guest list also included representatives from other engineering societies, senior engineering students from New Mexico colleges and universities, and civilian technical personnel from the Sandia Base.

Arrangements for the event were directed by Walter Blume, president of the New Mexico SPE; M. F. Fifield, chairman, Albuquerque Chapter; Howard A. Person, vice president, NMSPE; Walter K. Wagner, national director, NMSPE; and T. McCarty, chapter director

Felix E. Wormser Appears On Tulsa Program

Felix E. Wormser, new Assistant Secretary of the Interior in charge of mineral resources, spoke recently before a Tulsa, Oklahoma, gathering that included Tulsa Chapter and other Oklahoma SPE members and local members of the four Founder Societies. Mr. Wormser's address covered the new Administration's policy toward the oil industry and stressed the importance of the engineer in relation to it.

Engineering Institute Participants



Dean Morton O. Withey of the University of Wisconsin's College of Engineering, and a member of the WSPE, presents an attendance certificate to Milton Johnson, the 1,000th participant in the University's 1952-53 Engineering Institutes. Another WSPE member, Professor Paul J. Grogan, director of the Institutes, looks on.

Franklin County P.E.'s Hold Family Picnic

June 23 was the date of a family picnic sponsored by the Franklin County Chapter, Ohio SPE. The event was held at the Ohio State University Golf Course in Columbus, and members and guests played golf or took part in other sports before the supper was served. Officers for both the chapter and the newly-organized ladies' auxiliary were installed during the supper hour.

At another recent meeting, the Franklin County engineers were hosts to the Central Ohio, Eastern Ohio, Hocking Valley, Marion, Muskingum Valley, Ohio Valley, Portsmouth, Southern Ohio, and Zanesville chapters when registration certificates were presented to new P.E.'s from their areas at the Columbus Y.M.C.A. Joseph G. Gepfert of Cleveland was the guest speaker for the occasion, talking on *Professional Competence —What Next?*

Golden Gate Chapter Hears C. D. Allen

C. D. Allen, the newly elected president of the California SPE, was the guest speaker at a recent meeting of the Golden Gate Chapter in San Francisco. The subject of his talk was *Plans and Action for 1953-54.*

Petroleum Lecture Given In Beaumont, Texas

Members of the Sabine Chapter, Texas, SPE, recently heard Homer Fort, Jr., of the Magnolia Petroleum Company, give a nontechnical lecture on the petroleum refining industry. The address was supplemented with color slides shown by R. G. Dixon, plant photographer.

Russell B. Terry, chapter program chairman, was in charge of the arrangements for the meeting which was held at Lamar Tech.

Georgia Summer Meeting

The seventh Annual Summer Meeting of the Georgia SPE was held June 15-16 at the King and Prince Hotel on historic St. Simons Island, Georgia. Highlights of the program included inspection tours of the Georgia Power Company's multimillion dollar steam power plant at Crisp Island, the Brunswick Pulp & Paper Company's bleached sulphite paper mill, the Hercules Powder Company and the Dixie Paint and Varnish Co., in addition to social and athletic activities. Lawrence S. Miller of the Southeast Chapter was general chairman.

Another important Georgia event was the Annual Banquet, held recently in Atlanta, as the climax to a full day of business sessions and forum discussions. NSPE President John D. Coleman was the featured speaker at the dinner at which C. L. Emerson presided.

Income Study Made In New York City

The New York Chapter, NYSSPE, has recently completed and made public the results of an income survey of professional engineers in the metropolitan area. The average annual salaries for the participating P.E.'s who are self-employed, working for private firms, and in civil service were found to be $22,307, $10,989, and $7,028 respectively. The median incomes for the same three groups were $16,000 for the self-employed, $9,000 for the privately employed, and $6,630 for the civil service category. The average for E.I.T.'s was found to be $5,871, while the median was $5,830.

Statistics were also made available on incomes according to branch of engineering, increase in incomes since 1939, and pension plans. An analysis was made of basic salaries of the privately-employed P.E.'s and E.I.T.'s according to NSPE's grade classification, and a comparison of salaries and working hours was also developed.

Massachusetts SPE Publishes History

Under the direction of Raymond C. Newton, who was appointed historian of the Massachusetts Society of Professional Engineers in 1949, a 54-page history of the Society has been prepared and published as a sixteenth anniversary event.

The impressive, illustrated booklet gives a running account of the highlights of MSPE activity for the past sixteen years, includes lists of Society aims and accomplishments and past and present officials, and presents graphic charts that show the growth in membership, the service record of state committees, distribution of income, and the development of the Society's magazine.

Illinois Meetings

Capital Chapter P.E.'s met recently in Springfield, Illinois, to hear City Engineer Charles Nelson as guest speaker. Members of the Central Illinois Chapter were shown two Goodyear Rubber Company films on the use of belt conveyors at a recent dinner meeting. And Rockford Chapter engineers have lately sponsored a panel discussion on engineering manpower utilization, with F. T. Agthe, Henry Goehring, and Edwin W. Seeger as forum participants.

(. . . *more news on page* 33)

Letters

(*Continued from page* 5)

schools, and water supply were all regarded as fields for private enterprise. The supply of public transportation in metropolitan areas has gradually come into the same class.

The principal competitor of public transport is the private passenger automobile, but this vehicle requires so much highway and parking space that it is impractical to attempt the development of a metropolitan area on this basis. Furthermore the direct and indirect costs to the users of such transport are too high. Surface vehicles competing with other vehicles for space on the surface of our crowded streets and highways cannot compete with the private automobile in speed, and, unless time is worth very little, cannot draw passengers from the users of the automobile. Rail lines operating on fully graded separated rights of way in our metropolitan centers are the only means capable of supplying speed; and where they do this, as in Boston and New York, the load carried does not suffer materially from automobile competition. It should be noted that the deficits that have arisen in New York are largely due to surface transport operated as part of the NYCTS together with an unwillingness to charge an adequate fare. But the deficits incurred are less than 10% of the cost to the public if New York were forced to rely solely on surface vehicles or the private automobile instead of the rapid transit divisions of the NYCTS.

In contrast to some other public utilities, maximum rate of return on investment in the transport field is secured by rendering a low grade of service. This has been expressed by the well known statement that "The dividends are in the straps." This property of the business of public transportation and the low standards of business morality that formerly prevailed in that industry have tended to increase the demand for public operation and ownership, even while it is still possible to secure capital for this field.

While capital can be obtained for bus operation, these vehicles are inherently unable to compete with the private automobile. They also rely for profitable operation on securing use of highway space without paying a proper share of the cost. And because of the poor loading and unloading characteristics that have been designed into most of these vehicles in city service, they spend one-quarter to one-third of their time on the road standing still.

W. H. T. Holden, P. E.,
Pasadena, Calif.

Professional Status . . .

Dear Editor:

In reference to the letter appearing in the May issue of American Engineer written by Mr. Earl H. Gerlach, P. E., Solon, Ohio, I have a comment to make. Mr. Gerlach pointed out the suppression of the engineers' professional standing. I am a former employee of North American Aviation, Inc., Design Engineering Section. Fifteen hundred other design engineers and I were convinced that our professional standing had been derated since we were draftsmen drawing items not at all related to our major field.

However, the Employment Department is not entirely to blame. At the time of my termination, the employee relations man told me the company can do nothing about the disguising title given draftsmen because it is a U. S. Navy plant and the Government determines the job classifications and titles.

The situation is not hopeless since the engineer who wants to be a professional man does not have to betray his fellow engineers by accepting this type of job.

John J. Oezer, E. E.
Cincinnati, Ohio

Membership Idea . . .

Dear Editor:

The engineering profession is in need of a unity organization and NSPE is in need of more members. There are approximately 200,000 registered engineers in the country

(*Please turn to page* 40)

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(For more information see back cover)

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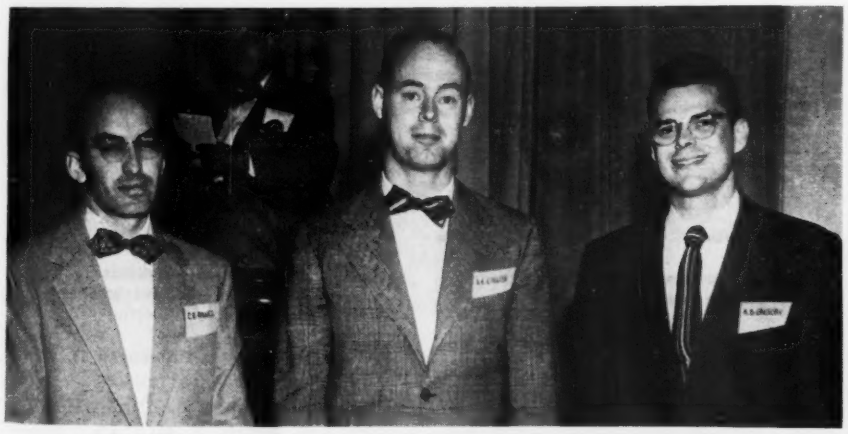
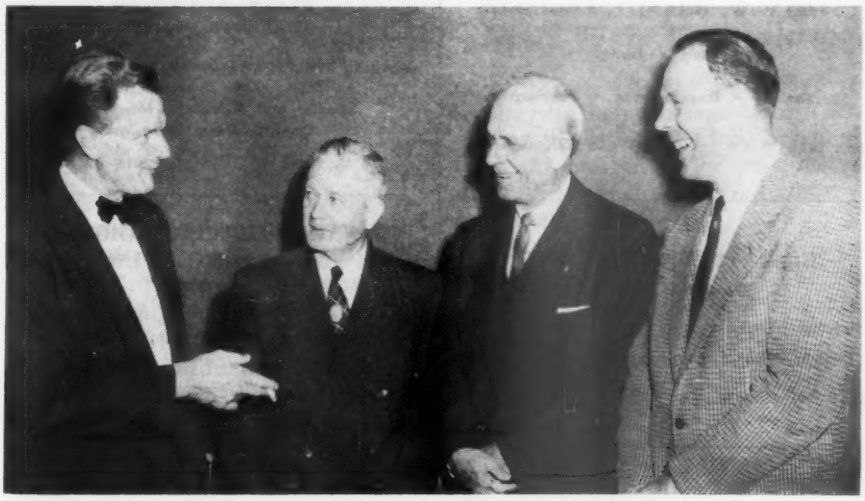


NEW MEXICO SCENE — Pictured at a recent New Mexico meeting, l. to r. below, are: Walter Blume, NMSPE president; Harry Telleyer; T. Carr Forrest, Jr., NSPE president; and M. F. Fifield, chairman, Albuquerque Chapter, NMSPE. (Story on p. 30.)

Akron Annual Dinner

Akron District SPE members held their annual dinner meeting June 2 at the Barberton Brookside Country Club. Alvin C. Sherrill, personnel director of the Columbia Southern Chemical Corporation, was the guest speaker.



SMART REGISTRANTS — C. W. Rhodes, R. E. English, and R. B. Gregory, l. to r. above, recipients of highest grades in recent Ohio engineering exams, are pictured during a certificate presentation ceremony sponsored by the Cleveland SPE.

Hudson County Engineers Hear Allan E. Surosky

At a recent dinner meeting, held in Jersey City's Fairmount Hotel, the members of the Professional Engineers of Hudson County, NJSPE, heard Allen E. Surosky speak on *Environmental Testing*. Mr. Surosky is manager of the engineering division, United States Testing Company, Inc.

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California Convention

Annual Meeting in Fresno Attracts Engineers from throughout the State

Members of the California Society of Professional Engineers held their Annual Meeting at the Hotel Californian in Fresno, June 4-6. Special lectures, chapter and state officers' seminars, field trips, panel discussions, and a varied social program for engineers, their wives, and other guests highlighted the three-day conference.

NSPE's retiring president, John D. Coleman, was the featured speaker at the closing banquet at which George Zelhart, retiring CSPE president, served as master of ceremonies. The installation of the slate of new officers, headed by C. D. Allen, was also held during the banquet.

Speakers at other events included Frederick C. Lindval, chairman, Division of Engineering, California Institute of Technology, and Bert Stewart, Jr., public relations consultant and field secretary for the National Automobile Club. Panel discussion topics were: *Private Practice, Engineering in Sales and Industry,* and *Engineers in Public Service.*

Field trips were arranged to permit the engineers to visit the Pine Flat Dam, the Roma Winery, the Producers Cotton Oil Company, and the North American Aviation Plant. A special engineering exhibit was also open on the Mezzanine of the Hotel Californian.

P.E.'s At Work

Engineers Frederick H. Paulson, Milton E. Nelson, William A. Fisher, and Howard W. Holmes have been admitted as partners to the firm of Charles A. Maguire & Associates, Providence, Rhode Island. . . . Atlanta engineer Henry H. Sineath has been appointed to the newly created position of assistant to the director of Georgia Tech's Engineering Experiment Station. . . . Eugene Larson has been named sales manager for the E. J. Longyear Company, Minneapolis, Minn. . . . Roland G. Palmer is the new chief electronics engineer for Tammen and Denison, Inc., Chicago consulting engineers and industrial designers. . . . Martin J. Bergen of Newark, Delaware, has joined the Pratt Institute, Brooklyn, N. Y., as director of the Evening School of Science and Technology.

New Slate Of Officers In New York

Carl M. Gilt, of Brooklyn, N. Y., assistant purchasing agent for the Consolidated Edison Company, has assumed office as the new president of the New York State Society of Professional Engineers, succeeding Edward J. Nunan of Buffalo. Other society officers for the 1953-54 administrative year include: Thomas M. Linville of Schenectady, first vice president; Herbert F. Rommele of Port Chester, second vice president; Patrick M. Corry of the Bronx, treasurer, and Ernest F. Fox of Forest Hills, Queens, financial secretary.

News From Pennsylvania

Northeast Chapter engineers recently held their thirteenth annual dinner at the Scranton Club, Scranton, Pa., with Lawrence Tice, president of the International Textbook Company, as guest speaker.

Two other interesting meetings recently reported were those of the Johnstown and Midwestern Chapters. William J. Dimond was guest lecturer at the Johnstown event, speaking on *Aerial Surveying and Mapping;* while T. L. White of the Commercial Shearing & Stamping Co., Youngstown, O., spoke on *Tunneling* before the Midwestern group.

Public and Engineer

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etc. With the further growth of the participation of the engineers in public works construction and civilian life, those engaged in such work became known as "civil engineers," and the final sanction of the word "engineer" was made by the "Institution of Civil Engineers," founded in 1818 in London. Later on with the division of engineering into various branches of the profession, there came about the designations of mechanical engineers, electrical engineers, chemical engineers, mining engineers, structural engineers, architectural engineers, aeronautical engineers, naval engineers and, more recently, electronic engineers and nucleonic or atomic engineers.

It is of interest to note that while George Washington, Benjamin Franklin and Thomas Jefferson could be regarded respectively as the first great surveyor, electrical engineer and architect of this country, the origin of the modern engineering profession in the United States is traced to the French military engineers brought by General Lafayette to help America win her independence. Brig. General Louis LeBegue du Portail and his fellow French officers were members of the "Corps de Genie" (which means "Corps of Engineers") of the Army of the King of France. They organized, trained and led three companies of "Miners and Sappers" as part of the Continental Army, such being the designation given them by General Washington.

Later, after peace was concluded with England, in 1802 by Act of Congress, was established "The Corps of Engineers" of the U. S. Army. It is from these beginnings that the engineering profession evolved in America.

The question now arises: Has the adoption of the French word "Ingenieur" in almost all of the non-English speaking world (with some very slight modifications in the spelling of respective languages) brought a better and truer understanding and appreciation by the public of the work and achievements of the engineering profession than what it has brought to it in the English speaking countries? It is the opinion of this writer, based on study and personal experience, that almost up to this day the answer would be in the affirmative. And this in spite of the fact that the engineering profession in America has already reached a premier position in the world. There are several causes for that. First, by public custom and laws, some of them dating many years before our several States began to enact laws for the registration of qualified professional engineers, in most countries of Continental Europe no one would dare use before the public for self-description the word "engineer" unless, like his cousins of the other two principal learned professions, Law and Medicine, he had passed successfully through a complete engineering course in a nationally approved University and graduated with the degree of "Engineer." This rigid system and even the admission of engineering students only after an entrance examination so as to "weed out those who are lax in sound judgment and technical imagination," in the words of one of my old English professors, has been also responsible for the relatively small supply of highly qualified engineers in the past in Europe. This in its turn may explain why the engineering profession in those countries has enjoyed relatively such a high standing in the eyes of the public, in remuneration and also in society circles, where engineers rated equal to, if not above, lawyers and medical doctors.

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To this day it is an accepted custom to address an engineer in Spanish speaking countries as "Senor Ingeniero," as "Monsieur l'Ingenieur" in France and Belgium, as "Herr Ingenieur" in Germany or Switzerland, as "Gospodin" or "Pane Ingener" in Slav-speaking countries. The same reverent address preceded by "Mister" is also applied to people of other learned professions in those countries.

It would seem very unusual in the English speaking world for someone to call you "Mister Engineer." The English-speaking people who have pioneered and practiced freedom and democratic form of government for centuries, have kept the expression of their respect to the dignity of any deserving man in the admirable single address of "Sir." When these people become conscious of and familiar with the benefits they have received from any group or class of men, they would coin a word of endearment for such men. Is it not a fact that the engineer has not yet earned sufficient popularity in the English speaking world to have a nickname bestowed upon him such as the "Doc" has in the Medical and the "Cap" in the Military or Police professions?

There could hardly be any doubt that the word "engineer," because of its direct origin from the word "engine," has some definite limitations and cannot alone be interpreted by the public to mean "creative" engineering except by a stretch of the imagination. As a word it is claimed as descriptive of such "non-creative" occupations as those of the locomotive engineer, the breaker engineer, the hoist engineer, the flight engineer, the hotel engineer, the stationary engineer, etc., etc. Who could deny anyone in a free country the right to call himself an engineer when such a man has something to do with some sort of engine? This is precisely why the "creative" engineer has tried to separate himself from the "engine" engineer by adopting for himself the more clear designation of "professional" engineer.

In the spectacular rise of the industrial might of this nation in the last fifty years almost all classes of people have made their contribution, and in a free and democratic manner anyone fit to take part in the work has been so employed. While the unskilled, the skillful, the self-trained and the formally educated have all been more or less responsible for this progress elsewhere, as now in the United States, it could not be denied that all material things that have benefited this country and the rest of mankind have been mainly the result of the work of the engineering profession everywhere.

All this could have never been possible without the unfailing efforts of the engineering profession. It is safe to predict that as this enormous catalogue of useful things continues to grow, the public, which is the final judge of the usefulness of its members, will begin more and more to realize and understand who is actually doing the thinking, planning, designing and the creating in general, of all this abundance of help and enjoyment to man. For the scientist in any branch of Nature's domain will dream, invent, discover, prove and proclaim new ideas, laws and theories; but to make them accessible, workable and usable to the average man, it will take the work of the "creator of usable things" to have them in plenty at a reasonable cost. It is in this that the engineering profession rises to unsurpassed heights. The better appreciation of the engineer by the public will not, however, come without an organized effort from the professional engineers, who in the past have mostly remained in seclusion. They have to take a more active part in the affairs of public life. This will make the public more conscious of their existence

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Letters

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while only approximately 30,000 are organized in NSPE.

To make non-members desirous of joining NSPE, and thus speeding the arrival of a practical unity organization, they must be convinced of its need. This could be done by a nation-wide advertising and publicity campaign sponsored by NSPE, and followed up by individual contacts at the local level. We must get our literature into their homes month after month. We must get them out to our local meetings. They must learn what NSPE has done in the past, is doing in the present, its plans for the future, and the growing need for a professional type of unity organization based upon individual membership and participation.

The following plan is suggested as one approach to the problem:—

1. Complete a mailing list of all registered engineers who are not members of NSPE.
2. Offer them by mail and/or personal contact a *special* one year membership in NSPE for $5.00. This to include a year's subscription to the AMERICAN ENGINEER, other literature as issued by NSPE, invitations to attend local, state, and national NSPE meetings, and to be placed on the mailing lists of their local and state chapters. They would participate only as interested observers having none of the rights of full members. This offer to be made *over and over* until wide acceptance has been achieved.
3. Request their participation as regular members at the end of the year.

It's the $15.00 that stops many from joining. Here is a way that initially eases the pocketbook. During the year, those that have any interest in the organization, will be shown the need, and may continue as regular members.

For the engineers that accept the offer, the plan would be practically self supporting. They then receive our literature, month after month, explaining our objectives. As the circulation of the AMERICAN ENGINEER increases, so will its advertising value. If at the end of the year we receive only a 10 to 20% response, it would still increase our membership by 50 to 100%. The greater NSPE's membership, the greater its voice as a workable organization for American engineers. Is such a plan worth trying?

J. STUART FRANKLIN, P. E.,
Saugus, Mass.

►Reader Franklin's unique idea has been passed along to the Chairman of the National Membership Committee. —*Editor.*

Engineer and Public

(*Continued from page* 36)

and work and should give them a better remuneration than at present in their untiring efforts for the good of mankind.

The time is not far distant, in my opinion, when the professional engineer in the United States will hold an outstanding position amongst the other learned professions. This will come with the more involved and complicated methods, processes and devices which appear more and more in modern technology and industry and where clear thinking, professional training and experience will become an absolute requirement. While there will be as now various tasks of certain degrees of varied responsibility for the members of the profession, it will rise as a whole to a much higher standard of quality.

It has been a great hope and promise to the engineers of this country that the National Society of Professional Engineers, with State Societies and Chapters in all States, has been now for years a great force for the achievement of better appreciation of the work of the engineer by the public. To this end many of the other National engineering societies of America have also helped. The young man who will decide today to choose the profession of engineering can find in all these groups the guardians of his future; and, in joining the altruistic, unselfish and most human of professions, he will serve his fellowmen, his country and will also cultivate within himself "a few of the powers of our Maker, the One who was and will remain the Greatest of Engineers."

Corporate Practice Bill Withdrawn in Connecticut

Following the withdrawal of the legislation in New York which would have permitted corporate practice of professional engineering (See AMERICAN ENGINEER, May, 1953), the Connecticut Society has advised of a similar legislative situation and result in the Nutmeg State.

The Connecticut Society went on record as opposed to the bill and prepared a statement giving the reasons for its stand, but the bill was withdrawn before it reached the floor of the legislature.

The prepared statement of the Connecticut Society declared that the practice of engineering by corporations would open the door for decreased supervision and flagrant use of registration. Corporate practice would in effect be a watering down of the state registration law, the statement declared.

Postscripts

(*Continued from page 28*)

see, summed up all my beliefs when he recently wrote, "All professionals earn more than a daily wage. They are duty bound to render all the service required, regardless of the wages received. The engineer must protect the public health and safety whatever his task or stipend. As professionals we inherit a long tradition of nobility. Ours is the task of bearing the service torch in an industrial society."

We, as a profession, are charged with the responsibility of governing ourselves. To that end it is to our advantage to produce the most well-trained, the most well-rounded graduates in the history of engineering. By improving the quality of our engineering graduates, we will automatically improve the standing of our profession.

Every time the problem of improving our profession comes to my mind, I think of the masthead of my hometown newspaper. On that masthead are inscribed these words: "The destiny of a city is merely a composite picture of individual ambition." By paraphrasing that slogan slightly, we can apply it to this problem.

Engineering will never be any better than engineering graduates. Plato said that a man would go in the direction his education sent him. Too often we overlook important elements of our education in our search for technical knowledge . . .

I believe the basic weakness in engineering education and the subsequent weakness in professional engineering is the lack of ability to lead in the rank and file of engineering graduates.

Our technical training has not been neglected. In fact, events have turned in just the opposite direction. At the present time, there is much discussion concerning extending the period of study for a Bachelor's Degree from four to five years. Our educators have found it increasingly difficult to squeeze in sufficient technical knowledge to meet the varied challenges of industry within a four-year period.

Where then can a student develop the qualities that will stand him in good stead wherever he may be? The answer lies in student government and in professional societies. These activities would take up no room in the student's curriculum, yet their value to him would be untold . . .

John A. Perkins, President of the University of Delaware, wrote an interesting article recently entitled *You Can Direct Your Profession's Future.* "I suspect," stated Dr. Perkins, "that more engineers fail on the job or don't reach the pinnacle of their profession for lack of a liberal educational background than ever fall short because of technical incompetence.

"As professional engineers you cannot simply take for granted the other elements in the population will look out for your special interests and responsibility in the field of education—engineering education."

We will soon have to face the world with only the ability and knowledge within our minds. Our employers, clients, friends—all of society—will judge us for what we are.

This judgment will be based not only on what we know but also on how well we can lead and direct others.

It would be very difficult to place an accurate estimate on the exact amount of importance society will place on each of the attributes of a well-rounded personality. It would be foolish, however, to assume that a serious deficiency in any of these qualities would not be a great hindrance to the individual.

If we learn now the standards by which we will be judged, it will be considerably easier to meet those standards.—***End.***

Ohio Case

(*Continued from page 26*)

excessive costs in preparing engineering designs and specifications, it was stated.

In reversing the lower court, the Supreme Court stated that it was within the right and duty of the Turnpike Commission to exercise its discretion to determine the plans, specifications and materials. "The only restraint upon the exercise of discretion by the commission is that which the law imposes upon all administrative bodies, viz., that it act in good faith and not in abuse of its discretion."

The high court pointed out that the legislature had specifically rejected proposed amendments to the law to require alternate bids and noted that the commission had employed a "recognized nonresident engineering firm as consultant," had held public hearings at which various designs and materials were discussed and that the effort to prove that the chief engineer of the commission and the consulting engineers had withheld information as to relative costs had failed. "No bad faith having been shown, the court can not substitute its judgment for that of the commission. This would be true even though the commission may have erred in judgment. Error of judgment does not invalidate discretion, exercised in good faith."

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Age: 42 to 50. Background: Successful administration of the engineering function from headquarters of a multi-plant heavy industry, preferably an integrated primary producer of metal. Degree in mechanical or electrical engineering.
Personal Qualifications: Proved record as a successful leader at a high level; technical competence sufficient to merit respect and following of many highly capable young engineers. Must be both forceful and tactful in dealing with all levels of personnel in both the headquarters organization and the individual plants. Must have the ability to develop and maintain an enthusiastic engineering organization. Because of expansion plans and dispersed operations, this job will require a great deal of energy and some travel.
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STRUCTURAL ENGINEER. $600 to $700 per mo. depending on experience. Age: open. Degree and several yrs. exp. in industrial building. West Coast. Send resumé to Box 7-C-3, American Engineer.

NEW LITERATURE

To help the offering firms determine which literature you require, when requesting an item, be sure to list all specifications shown . . . and say you saw it in the AMERICAN ENGINEER.

BULLETIN ON CLEVELAND MODEL 95 TRENCHER — A bulletin fully describing the Cleveland Model 95 trencher has been published by the Cleveland Trencher Company. Copy stresses job applications and outstanding features. Complete dimensions and specifications are given, including tables of optional trench widths and digging wheel and traction speed combinations. Copies of the Cleveland Model 95 folder may be obtained without obligation by writing on business stationery to the Cleveland Trencher Company, 20100 St. Clair Ave., Cleveland 17, Ohio.

—AE—

GEAR DRIVE—An interesting bulletin in full color describes in detail a new HOLLOSHAFT GEAR DRIVE to operate vertical turban pumps where electricity is not available. Cut-open views show many new features. A copy of the bulletin may be obtained by addressing your inquiry to U. S. Electrical Motors Inc., P. O. Box 2058, Los Angeles 54, Calif.

What's New

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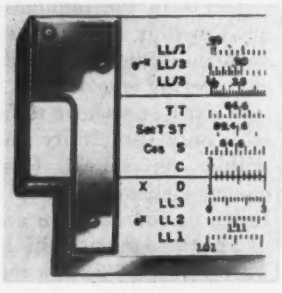
NEW SLIDE RULE FEATURES COLOR CODING

Item 1



With the VERSALOG for Professional Engineers, made by the Frederick Post Co., calculations involving trigonometric functions are performed without the usual hazard of errors by simply matching the color of the trig scale with the same color of the corresponding C, D or CI scales.

The Versalog Slide Rule is extremely useful in computing Kinetic Energy, Moment of Inertia. Also provides fast and accurate calculations in radiant heat transfer.

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NEW INDUSTRIAL MODEL TRANSIT

Item 2

The Optoplane—a new industrial model of the Gurley Precision Transit for facilitating jig and fixture location and alignment—has been added to its line of transits by W. & L. E. Gurley, 100-year-old manufacturer of engineering and surveying instruments. It has numerous applications in many industries, including aircraft, automotive, paper processing and heavy construction.

Already in use by plane builders, the new Optoplane establishes the horizontal and vertical planes necessary in locating and setting up jigs for sectional assembly.

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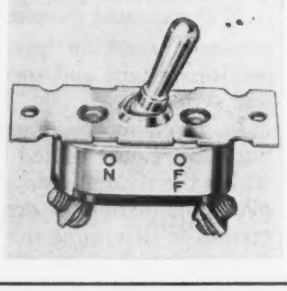
AIRCRAFT TOGGLE SWITCH

Item 3



A bomber type, aircraft toggle switch was recently announced by The Arrow-Hart & Hegeman Electric Co. Both 2 and 3 position, single pole types are available with momentary or maintained contact. Toggle levers are supplied with plain, radioactive or fluorescent tips.

The mounting plate is 2⅛" high and ¾" wide: depth of the switch including terminals is 1-1/6". The toggle lever is ⅞" in length with a total movement of 40° in the 2 position model and 50° in the 3 position model.

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HELLER AIR DRIVEN TACKER

Item 4

The fastest-loading, fastest-shooting air-driven tacker on record, according to the manufacturer, is now in production at The Heller Stapler Co., where new models with a bumper-type trip drive more than 200 staples per minute. This speed is the result of a simplified direct drive developed by Heller. The new bumper trip features an advanced cylinder principle to distribute 40 to 80 pound air pressures evenly for swift and fool-proof driving.

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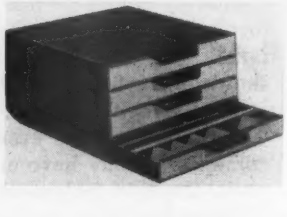
NEW METHOD FOR STORING PARTS

Item 5



Precision Equipment Co. announces all-steel "Little Gem" Tiny Parts Cabinets for use in industrial plants, school shops, garages, home workshops, as well as in all types of offices.

"Little Gems" consist of two 1½" high drawers in a rugged one-piece welded frame. Overall size 3¼H x 11D x 11"W. Each drawer furnished with 8 dividers, giving a total of 24 adjustable compartments. Units may be stacked in one solid, rugged assembly.